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CONTENTS.

Page

I. Account of the Dundee and Newtyle Railway, . . 1

II. English Husbandry, as practised in a Parish in one of the Midland Counties, ... 29

III. On Converting Strong Loam into Permanent Pasture. By Mr G. Sinclair, New Cross, Surrey, ... 45

IV. Flour-making in Ireland, ... 48

V. On Extending the Annual Shows of the Highland Society of Scotland, ... 53

VI. Sugar-making in the West Indies, ... 56

VII. Theory and Practice in the Application of Putrescent Manures, ... 76

VIII. On the Working of Bell's Reaping-Machine, . . 64

IX. On the Adulteration of Clover and Turnip Seeds, . . 89

X. Experiments with Liquid Manure, ... 92

XI. Miscellaneous Notices, ... 97

I. Irish Trade with Ireland, 97.—II. Comparative Wealth of England and France, 98.—III. Statistics, ib.—IV. Remarkable Elevations, 99.—V. On the Benefits of Field Gardens for the Labouring Poor. By Captain Scobell, R. N., ib.—VI. Agricultural Employment, 101.—VII. Rules for Managing Cottage Allotments, 102.—VIII. Plan for promoting the Employment of superfluous labouring Population, and at the same time conferring a great Benefit on the Land, ib.—IX. Ancient Price of Labour, 104.—X. Chimney Soot as a Manure, 105.—XI. On the Cultivation of Hemp, ib.—XII. Butter, 106.—XIII. Adulteration of Bread, 107.—XIV. Loss of Weight in Cooking Animal Food, 108.—XV. To raise Pease in Autumn, 107.—XVI. Obesity of Geese, ib.—XVII. Fondness of Poultry for Pepper, ib.—XVIII. Wine from Potatoes, 110.—XIX. Uses of the Horns of Cattle, ib.—XX. Domestic Yeast, ib.—XXI. On the Distance to which Spray of the Sea may be carried, 111.—XXII. Giallo antico, ib.—XXIII. Salt-mines of Saltzberg, ib.—XXIV. Indian Coffee, 112.—XXV. Peruvian Bark, 113.—XXVI. The Chapel-Oak of Allonville, ib.—XXVII. On the Custom of Planting Yew-trees in Churchyards, 115.—XXVIII. Tincture of Roses, 116.—XXIX. The Peach and Nectarine Trees distinguished by their Germens, ib.—XXX. The Misseltoe, ib.—XXXI. The Fraxinella, ib.—XXXII. The Scottish Thistle, ib.—XXXIII. Wild Cotton-tree, 117.—XXXIV. Bats, ib.—XXXV. Serpents, ib.—XXXVI. The Teal, ib.—XXXVII. The

Nightingale, 118.—XXXVIII. Instinct of Wild Ducks, ib. —XXXIX. Mackerel burying themselves in the Mud, 119. —XL. Mode of Fishing in China, ib.

XII. Quarterly Agricultural Report, ... 119

XIII. Tables of the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn; of the Revenue, &c. . 122

XIV. Foreign Corn Markets, ... 124

XV. A Plan for the Commutation of Tithes, and the Improvement of the Parochial Economy in England. By the Rev. John Thomas Tryon, Bulwick Rectory, Northamptonshire, ... 127

XVI. Description of the Dairy at Alnwick Castle, . . 157

XVII. On the Cultivation of Flax in Holland and in Scotland. By Mr William Aiton, Hamilton, ... 159

XVIII. On an Improved Method of Transplanting Large Trees. By Mr James Munro, Manager of Messrs Dickson and Turnbull's Nursery, Brechin, ... 183

XIX. Observations on the General Circumstances and Agriculture of the Baronies of Forth and Bargy, in the County of Wexford in Ireland, ... 187

XX. On the Culture of the Chiccory (*Cichorium Intybus*). By Mr Gorrie, Annat Garden, ... 206

XXI. Remarks on Upper Canada, as a Country for Emigrants. By Mr James T. Sommerville, Mayfield, Township of Whitby, Upper Canada. 208

XXII. On a Case of Fistula in the Withers of the Horse; and on Cases of Disease in the Heart of Cattle arising from their swallowing Needles and Pins. By Mr William Dick, Veterinary Surgeon, Edinburgh, ... 221

XXIII. On the Effects of the Low Price of Corn by Foreign Importation on Agriculture and Manufactures, ... 226

XXIV. On Straw and Hay Cutting Machines, ... 246

XXV. On a New Reaping Machine, invented by Mr Joseph Mann, of Raby, near Wigton, Cumberland. With a Plate. By Mr James Slight, Edinburgh, Curator of the Museum of Models of the Highland Society of Scotland, ... 250

XXVI. On an Economical Mode of applying Bone-Dust as Manure for Turnips, ... 258

XXVII. On the Tithe System of Scotland, ... 262

XXVIII. On a Mode of covering Seed-Corn without Harrowing, 275

XXIX. On the Present State of the English Peasantry, . 277

XXX. Notice on the Highland Society of Scotland, . . 280

XXXI. Notice on Grubbers or Cultivators, ... 281

XXXII. Tables of the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn; of the Revenue, &c. 282–284

XXXIII. Foreign Corn Markets, ... 284

XXXIV. On the Stipends, Manses, and Glebes, of the Clergy of England, ... 285

XXXV. On Training Standard Fruit-Trees. By Mr Gorrie, Annat Garden, ... 293

XXXVI. On Irish Agriculture, ... 296
XXXVII. On Smut in Wheat. By Mr John Donaldson, Donnington Park, Leicestershire, ... 311
XXXVIII. De Candolle's Theory of the Rotation of Crops, . 320
XXXIX. On the Dairy Husbandry of Holland. By Mr William Aiton, Hamilton, ... 328
XL. On Orchards around Farm-Houses. By Mr Main, Chelsea, 346
XLI. On Reaping with the Scythe, ... 350
XLII. On a Method of preventing the Attacks of Caterpillars on Fruit-trees and Bushes. By Mr William Brown, Pinefield, near Elgin, ... 39
XLIII. On the Culture of the Prickly Comfrey, or Symphytum asperrimum, ... ib.
XLIV. A Method of preparing Food for Horses, . . 378
XLV. Description of a Curd-breaker for Skim-milk Cheeses, . 384
XLVI. On a Method of Top-Dressing Permanent Pasture, . 386
XLVII. On Irish Landlords, ... 388
XLVIII. On the Agricultural Exhibition at Stirling, . . 406
XLIX. Miscellaneous Notices, ... 418
i. West Indies, 418.—ii. Imports and Exports of Ireland in 1801 and 1825, 419.—iii. Grants to the Charities in Dublin, 420.—iv. On the Infertility of Granite Soil, ib.—v. Experiments on Buck-wheat, 422.—vi. Method of obtaining Cream from Milk, ib.—vii. Swing Frames for Cheeses, 424.
L. Quarterly Agricultural Report, ... 425
LI. Tables of the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn; of the Revenue; Fiar Prices for Crop 1832, ... 437
LII. Foreign Corn Markets, ... 441
LIII. On the Education of the Labouring Class. By Mr William Hawkins, Hitchin, Hertfordshire, ... 443
LIV. Account of the Method of Planting Oaks at Levens, in Westmoreland, ... 457
LV. Forest Sports of Canada, ... 459
LVI. On the Preservation of Potatoes, ... 482
LVII. On the Characteristics of Cattle. By Mr William Aiton, Hamilton, ... 485
LVIII. On the State of Ripeness in which Corn-Crops should be when Reaped, ... 497
LIX. On Plug or Clay Draining. By W. S. Evans, Esq. of Selkirk House, Cheltenham, ... 501
LX. On the Culture of the Strawberry, ... 509
LXI. On the Objects and Effects of the late Farming Society of Ireland, ... 511
LXII. On the Agriculture of the County of Wexford in Ireland, 529
LXIII. On the Destruction of Seed-Corn, . . . 535
LXIV. On the Resting of Light Soils, and Consolidating them with the Presser, ... 543
LXV. On the Decay of the Heart-Wood of the Larch, . . 547

LXVI. On Tumours in Cattle. By Mr William Dick, Veterinary Surgeon, Edinburgh, ... 554

LXVII. On the Application of Vegetable Physiology to Agriculture, 562

Illustrations of Vegetable Physiology, practically applied to the Cultivation of the Garden, the Field, and the Forest; consisting of Original Observations made during an experience of fifty years. By James Main, A. L. S. 1833.

LXVIII. On the Agriculture of the Tropics, ... 565

The Tropical Agriculturist: a Practical Treatise on the Cultivation and Management of various productions suited to Tropical Climates. By George Richardson Porter, Author of "The Nature and Properties of the Sugar-Cane," &c.

LXIX. Miscellaneous Notices, ... 567

I. To produce Two Crops of Kidney Potatoes on the same ground in the same year, 567.—II. Fecundity of the Onion, ib.—III. Otaheitean mode of making Arrow Root, ib.—IV. Saxony Wool, 568.—V. Management of Bees in Cashmere, ib.—VI. Manners of the Fifteenth Century, 570.—VII. Old English Archery, 571.—VIII. Carriages, 572.—IX. Ancient marks on Paper, 573.—X. The Origin and Progress of Newspapers, 574.—XI. Calendar and Almanack; Years; Months; Weeks; Days, 576–580.—XII. London Post-Office, 581.—XIII. The Water Spider, 582.—XIV. The Possibility of Naturalizing the Fire-Fly, 583.—XV. Vocal Machinery of Birds, ib.—XVI. Blasting Rocks under Water by means of the Diving-Bell, ib.—XVII. The Teasel, 584.—XVIII. The Light of Rushes, 585.—XIX. The Pearl Fishery of Ceylon, ib.—XX. Stuffed Animals, 588.—XXI. Doll's Eyes, 589.—XXII. The Jew's Harp, 590.—XXIII.—The Chiragon or Guide for the Hand, 591.

LXX. Quarterly Agricultural Report, ... 591

LXXI. Tables of the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn; of the Revenue, &c. . 596–8

LXXII. Foreign Corn Markets, ... 598

LXXIII. On the Management of Cattle during the prevalence of Epizootic Diseases. By Charles Wilson, M. D. &c. Physician to the Kelso Dispensary, ... 601

LXXIV. The Theory of Putrescent Manures, ... 617

LXXV. Comparative View of the Agriculture of the Counties of Wexford and Galway in Ireland, ... 625

LXXVI. On the Foreign Corn Trade. By Mr Isaac Dimsdale, London, Editor of the Universal Corn Reporter, ... 643

LXXVII. On the Excretory Powers of Plants. By Mr Towers, Author of the Domestic Gardener's Manual, ... 656

LXXVIII. On the Law of Landlord and Tenant, . . . 669

A Treatise on the Law of Landlord and Tenant, with an Appendix containing Forms of Leases. By Robert Hunter, Esq. Advocate.

LXXIX. On the Disease in Cattle called the "Crochles." By

Mr Joseph Tait, Portsoy, Veterinary Surgeon to the Banffshire Farmer Club, ... 680

LXXX. On Wheel-Carriages. By Mr William Galbraith, A. M. Edinburgh, ... 683

LXXXI. On the Probability of the Reversion of Wheat into Grass. By William Blackadder, Glammis, ... 699

LXXXII. On the Purchase of Horses, ... 703

Advice to Purchasers of Horses. By J. Stewart, Veterinary Surgeon, and Professor of Veterinary Surgery in the Andersonian University.

LXXXIII. On Agricultural Statistics. By Mr William Hawkins, Hitchin, Hertfordshire, ... 704

LXXXIV. Remarks on Vegetable Physiology. By Mr Main, Chelsea, ... 713

LXXXV. On the Kinds and Quantities of Grass-Seeds suited to Alternate Husbandry, Permanent Pasture, Pleasure Grounds, &c. By Mr Charles Lawson, Seedsman to the Highland Society of Scotland, 714

LXXXVI. Gardens of Woburn Abbey, ... 725

Hortus Woburnensis, or a Descriptive Catalogue of upwards of 6000 Ornamental Plants cultivated at Woburn Abbey; with illustrative Plans for the Erection of Forcing-Houses, &c. and an account of their management. By James Forbes, Gardener to his Grace the Duke of Bedford.

LXXXVII. On the Raising of Wheat on Inferior Soils, . 727

LXXXVIII. Miscellaneous Notices, ... 730

I. Prices of Wheat in England, 730.—II. Malt-Duty, ib.—III. Hops, ib.—IV. West Indies, 731.—V. Value of the West India Colonies, ib.—VI. Statistics of Brewing in England and Scotland, 732.—VII. Emigrants to Canada, ib.—VIII. Committals in England and Wales, 733.—IX. Consumption of Silk, ib.—X. The Lantern, ib.—XI. New Tail-piece for the Violincello, ib.—XII. On the Savage State of Man, XIII. Misconceived Influences of the Moon, 736.—XIV. Fertilization of Old Lavas, 737.—XV. On the Culture of the Garden Bean, ib.—XVI. To prevent the Sprouting of Store Onions during the Winter, ib.—XVII. Saving Peas and Beans from Mice, ib.—XVIII. On Securing the Fruitfulness of Fruit-trees, ib.—XIX. Golenos Oak, 739.—XX. On the Utility of planting Ash, ib.—XXI. To Destroy Moles in Gardens, 740.—XXII. Water in Flour, ib.—XXIII. Compression of Water, 741.—XXIV. Signs of Rain, ib.—XXV. Preservation of Substances by means of Alkalis, 742.—XXVI. Greenhouse Plants, ib.—XXVII. The Turnip-fly, 743.—XXVIII. Experiments on Smut in Wheat, 744.—XXIX. Remedy for Fruit-trees casting the Fruit, 745.—XXX. Discoloration of the Leaves of the Rose-tree, ib.—XXXI. The Candleberry Myrtle, 746.—XXXII. Oxalis crenata a rival to the Potato, ib.—XXXIII. Crucible for Fusion, 747.—XXXIV. Chasseur Ants of Trinidad, ib.—XXXV. White Mon-

key, 749.—XXXVI. Lawson's Agricultural Museum in Edinburgh, ib.

LXXXIX. Quarterly Agricultural Report, ... 751

XC. Foreign Corn Markets, ... 759

XCI. Table of the Revenue, ... 760

XCII. Tables of the Prices of Grain, Butcher Meat, and Wool; of Monthly Returns of Foreign Corn, &c. . . . 761–762

XCIII. On the Dairy Cattle of Ayrshire. By Mr William Aiton, Hamilton, ... 763

XCIV. Remarks on the Reversion of Wheat into Grass. By Mr Main, Chelsea, ... 780

XCV. On the Unprofitableness of Old Pasture, compared with New. By John Boswell, Esq. of Kingcausie, Aberdeenshire, . 783

XCVI. On Cottagers' Garden Societies. By James Stuart Menteath, Esq. Younger of Closeburn Hall, ... 791

XCVII. On Greenhouses. By Mr Towers, Author of the Domestic Gardener's Manual, C. M. H. S. 794

XCVIII. On Burning Heath to render it an efficient Pasture. By Mr Alexander Laidlaw, Bowerhope, Selkirkshire, ... 808

XCIX. An Account of the Orchards in Clydesdale, . . 814

C. An Account of a Comparative Trial of Stable-Manure and Bone-Dust for raising Turnips on a Clay-Soil. By Mr Henry Maxwell of Calderwood, ... 835

CI. Emigration to Upper Canada as a means of relieving the Parishes in England of their Paupers. By Mr William Hawkins, Hitchin, Hertfordshire, ... 837

CII. On Enclosures, ... 843

CIII. The Principles which regulate the Treatment of Simple Wounds, considered with reference to Veterinary Practice. By Charles Wilson, M. D. &c. Physician to the Kelso Dispensary, . 853

CIV. On the Cleansing of High Roads. By Mr Robert Ballingal, Treaton, near Kennoway, Fifeshire, ... 875

CV. Remarks on the Excretory Powers of Plants, and M. Macaire's Memoir on that subject, in reference to Rotation of Crops, . 880

CVI. Miscellaneous Notices, ... 891

I. Sinking Fund, 891.—II. Dividends of Stock, 892.—III. Taxes Repealed since the Peace, 893.—IV. Taxation and the Gold Standard, ib.—V. Statistics of Spain, ib.—VI. Commerce of the United States, 895.—VII. Comparative Cost of Building, Provisioning, and Sailing a Vessel of 400 Tons, for one year, from a Prussian and an English Port, 895.—VIII. Revolutionary Victims in France, 986.—IX. Comparative Health in England, ib.—X. Average Price of Foreign Wheat, 897.—XI. Wool and Woollens, ib.

CVII. Quarterly Agricultural Report, ... 898

CVIII. Foreign Corn Markets, ... 916

CIX. Table of the Revenue, ... 918

CX. Tables of the Prices of Grain, Butcher Meat, and Wool; of Monthly Returns of Foreign Corn, &c. . . . 919–920

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ACCOUNT OF THE DUNDEE AND NEWTYLE RAILWAY.

Drawn up from Official Documents.

In the heart of Scotland is a great arable district called *Strathmore.* It is bounded on the north by the primitive range of the Grampians, and on the south by the transition hills of the Sidlaws, and it is open at both extremities. It is a trough-shaped valley of alluvial deposites, which fill up the space lying between these groups of mountains. In length it is twenty miles, in breadth about twelve; it has a very gentle declivity to the west, and it presents some agreeable undulations in crossing its breadth. A considerable river, the Isla, enlarged by its tributaries the Dean and the Ericht, meanders in a very serpentine course along the valley, till it loses itself in the Tay.

This great valley occupies a large portion of the county of Forfar, and a part of Perthshire. It comprehends the following parishes, namely, Airly, Alyth, Bendochy, Blairgowrie, Cargill, Cupar-in-Angus, Eassie and Nevay, Glenisla, Kettins, Kirriemuir, Kingoldrum, Meigle, Newtyle, Rattray, and Ruthven. These parishes contain, according to the census of 1831, 22,137 souls. They may collectively extend over 153,600 imperial acres, one-half of which may be occupied with pasture, woods, roads, rivers, fences, and houses; and the other half, or 75,000 acres, are appropriated to arable culture. Several large domains are to be found in this valley. Towards its eastern extremity, the

royal residence of Glammis Castle, now the property of the Earl of Strathmore, rears its ancient turrets in a pine forest of 1600 acres, and stands in the midst of a spacious park of at least 600 acres of permanent pasture. Belmont Castle, the beautiful seat of Lord Wharncliffe, occupies a conspicuous position at the western extremity. The Earl of Airly is also a large proprietor, along with many others of considerable importance.

The soil of Strathmore is generally a hazel loam, resting on a rather retentive subsoil; it is fertile, and admirably adapted to the five-course husbandry, which is characterised by the raising of green crops and spring-sown corn crops. It is also admirably adapted to the mixed husbandry, which incorporates the rearing of live-stock along with the corn crops. This last mode of husbandry is perhaps not so much attended to in this district as it might be, for we believe many of the farmers are in the habit annually of buying live-stock for fattening and wintering. The spirit of the farmers in this district stands high for activity and enterprise, and the consequence is, that an immense quantity of agricultural produce is annually raised in it. As one instance of an enterprising spirit among them, we may mention the fact, that it was a Strathmore farmer, Mr Hugh Watson, Keillor, who first introduced the use of bone-dust as a manure into Scotland.

Of the 75,000 acres of arable land, in a five-shift-course of husbandry, two-fifths, 30,000 acres, will be in old and new grass; two-fifths, 30,000 acres, in corn crop; and one-fifth, 15,000 acres, in fallow. Of the 30,000 acres for corn crops, 15,000 will be devoted to the growing of oats; and if we allow 6 quarters per acre as not too high an average for oats in this highly cultivated district, the gross quantity raised is 90,000 quarters per annum. But the greatest proportion of the oat crop on a lowland farm is consumed on the farm, in the shape of seed for the land, wages to the ploughmen, and food for horses. For these purposes, above 12,000 quarters will be required for seed; 35,000 for the maintenance of horses for labour, for the saddle, and young colts: 15,000 quarters for the wages of servants, which in this [illegible] we have supposed to be paid wholly in kind, as it is the [illegible] thing to the farmer whether he pay his servants in kind or [illegible] raised by the sale of produce; and 8000 quarters for [illegible]e of the farmers' families every year. These produce an [illegible] of 70,000 quarters consumed on the premises. Part,

say one-half of the remaining 20,000 quarters, may be sold to the millers in the country, who will dispose of them in the shape of meal to the villagers and the inhabitants of towns. The 10,000 quarters of oats ground by the miller into meal, will be reduced in weight to the weight of 5000 quarters; and if the half, or 2500 quarters, are sent to the large towns, the other half may be supposed to be sold in the country villages. The other 10,000 quarters will be sent by the farmer to the towns. Allowing 22 stones of 14 lb. as a fair weight for a quarter of oats, the 10,000 quarters will weigh 1375 tons. The weight of the meal sent by the millers to the towns will be 348 tons. Of the 15,000 acres cropped after the fallow-break, one-third, or 5000 acres, may be sown with wheat, and the remaining 10,000 acres with barley. This is perhaps a larger proportion allowed to the culture of wheat than the real practice warrants, for we believe that the culture of wheat has very much decreased in this district for some years past, partly owing to the unfitness of the quality of the soil for the wheat crop, and partly because it is found to be more profitable to extend the culture of turnips and potatoes, and barley after them, than to fallow the land without a crop in preparation for wheat. But let us take the assumed proportion as the basis of our calculation. Wheat cannot be estimated in this district at a higher rate than 3½ quarters per acre, which would give a gross produce of 17,500 quarters, of which ½ quarter per acre, or 2500 quarters, will be required for seed. The weight of good wheat is not too high at 4½ cwt. per quarter, so that 15,000 quarters will be 3187 tons. A part of this weight will be lost when the wheat is manufactured by the flour-millers in the district, who will sell the bran in the local markets, and supply the bakers in the villages with flour. Wheat, on being ground, loses nearly one-fourth part of its weight: this loss, and the necessarily small quantity of flour required by country bakers, will lessen the 3187 tons by only about 187 tons; so that 3000 tons may be taken as the disposable weight of the wheat crop, in the shape of flour and wheat. There will be 10,000 acres of barley, and its produce may be taken at 5½ quarters per acre, or 55,000 quarters in all. The seed will consume 7500 quarters, and if part of servants' wages and other contingencies are paid by barley, amounting in all to

4500 quarters, the disposable quantity may be 43,000 quarters. A quarter of good barley will weigh 3½ cwt., of course the whole disposable quantity will weigh 7525 tons; and as there are no distilleries in the district, the consumption by the country brewers must be very limited, say 525 tons. The licensed distilleries in the glens among the Grampians may, however, consume a considerable quantity every year, and allowing 1000 tons for this purpose, there are still 6000 tons, which may be sent to the large towns. Of the fallow division of 15,000 acres, we have allowed 5000 acres for bare fallow for wheat. Of the remaining 10,000 acres, three-fourths, or 7500 acres, will be devoted to the raising of the turnip, and the other fourth, or 2500 acres, to potatoes. A produce of 50 bolls per acre of 16 stone, 14 lb. to the stone, each, is not an extraordinary crop of potatoes, but that quantity will give 5 tons per acre, or 12,500 tons in all. The seed will consume 12 cwt. per acre, or 1500 tons. The consumption by masters and servants will not be less than 5000 tons; so that the disposable quantity may probably be 6000 tons. Of that quantity, a considerable quantity will be consumed in the villages and hamlets, inhabited by labourers who are not attached to any particular farm, or by artizans who follow the various professions in trade. Probably 2000 tons may be consumed in this manner, so that only 4000 tons will be sent to the large towns. But since the introduction of bone-dust for raising a part of the turnip crop, the culture of the potato has been extended, by reason of a superior command of farm-yard manure, and more ground may still be allowed to the potato. Not that fewer turnips will be raised, for they cannot be dispensed with where live-stock exist; but that a less extent of bare fallow will in future be permitted. If one-half of the 5000 acres of fallow land were to be devoted to the culture of the potato beyond what is at present, their produce will be 11,000 tons more at the disposal of the farmers; for the extended culture of the potato will experience no drawback beyond the seed required to plant it; so that 15,000 tons of potatoes may be sent to the large towns, if a market existed for such a large quantity from one district of the country.

Hence, according to the foregoing data, Strathmore raises a gross produce of 162,000 quarters of grain, out of which

10,723 tons may be disposed of in the large towns, and 125,000 bolls, of 16 stones each, of potatoes, of which 4000 tons may be disposed of.

We are not certain that we are quite correct as to the acreable extent of the *arable* portion of this district, as it is extremely difficult to ascertain such statistical details with accuracy. The avowed *Statistical* Account of Scotland does not contain these details, which are undoubtedly the most valuable portion of statistical knowledge. We hope the new Statistical Account, which is announced to be in progress under the patronage of the Church of Scotland, will present us with this useful information. The Schoolmasters, for a small remuneration, with the assistance of the clergy, could ascertain the arable extent; the wooded extent; the extent of pasture land; the number of farms, with the extent of each; the number of working horses, and the number of regular farm-servants, in every parish. In the absence of this knowledge, we must make an approximation only by supposition.

In the Report to the county of Forfar, regarding the projected railway along Strathmore, Mr Stevenson, civil-engineer, took the arable land of only three miles on both sides of the railway, and made his calculation of the probably disposable quantity of agricultural produce which might be obtained for transport at 5000 tons. The length of the valley from Forfar to beyond Cupar in Angus, twenty miles, being the same as stated by Mr Stevenson, we have taken the breadth at twelve miles, four times the width taken by that gentleman. We consider the arable portion of the valley to stretch from the northern margin of the summit of the Sidlaw Hills to the foot of the Grampian range, and that distance is not less than twelve miles. The amount of produce which we have estimated as being disposable in this extent, both in the country villages and at the distant towns, is 19,462 tons. If this amount is considered by some of our readers who are acquainted with this subject, as too great under present circumstances, we will console them with our conviction, that it is much less than it will be when the land in Strathmore shall have been still more highly cultivated by means of the *facility* obtained of transporting the produce of the soil to, and receiving in return the essence of fertility from, the seaport towns, by approved railways or steam conveyances. In

the mean time, we take 14,723 tons as the amount of the produce of the soil from this extensive and rich district, which will be ready to be transported to the large town which offers a transit of the greatest celerity and cheapness.

On looking at the map, it will be observed that Strathmore is quite an isolated district. Great natural barriers exist on the north and south sides of it. It has, it is true, two great natural outlets, but the one on the west is, at its extreme point, distant ten miles from the shipping port of Perth. The other, at its extreme east end at Forfar, is fourteen miles from the nearest sea-port. Among the Sidlaw Hills are some ravines or narrow valleys which admit of that range being traversed by roads. One opens at the eastern extremity at Forfar, from which a very undulating road runs to Dundee. Another road passes through the narrow passage of the Den of Glammis, and joins the Forfar road at Petterden. But these roads, how easy soever they could be made, being situate at an extreme end of the valley, could not be made available for the general purposes of the district. A third opening through this mountain range, is by the Glack of Newtyle, which is situate a little to the westward of the centre of the valley. These roads range in elevation from 500 to 760 feet above the level of the Tay. The lowest is that through the Glack of Newtyle, and being at the same time the most centrical, it is naturally chosen as the means of egress from Strathmore. Considering the injurious effects which long and heavy draughts impose on the improvement of the agriculture of a country, it is a source of astonishment, as well as gratulation, to observe the enterprising ardour of the farmers of Strathmore, which has overcome such physical obstacles to cultivation. As one proof of the superior cultivation of their valley, we have only to look at the estimated annual value of property, for the property-tax, in the parishes enumerated above, which amounted, in 1815, to L. 72,050.

The bottom of the valley of Strathmore, exhibiting a very level surface, has long been thought well adapted to a superior means of internal communication. So far back as the year 1788, a survey was made by the late Mr Whitworth of a part of the valley, with the view of forming a canal from Arbroath to Forfar. In 1817 the subject was taken up by the county of Forfar, and in that year Mr Stevenson was employed in making

a survey for a canal from Arbroath by Forfar to Cupar in Angus. In 1825 the idea of a canal was abandoned, and a railway was approved of. In that year Mr Stevenson made a very extensive survey at the desire of the County of Forfar, and of the Magistrates of Arbroath, Montrose, Brechin, Aberdeen, Forfar, and Perth, for a railway which was to extend along the valley, and throw off branches to the sea-port towns. Mr Stevenson carrying the line of railway nearer to the Sidlaw Hills along Strathmore than to the Grampian range, dissatisfaction was expressed by the inhabitants of the Strath nearer the Grampians, and Mr Stevenson was desired to consider whether two lines of railway might not be started from a point near Forfar, to the westward, to accommodate both sides of the Strath. He accordingly surveyed and reported on both lines.

During the settlement of this important point, the people in Dundee, who had all along been left out of view in this great national undertaking, took the alarm, that should this railway be accomplished, the shipping of the towns of Perth and Arbroath would be aggrandized at the expense of that of Dundee; and hitherto Dundee had supplied, by its enlarged harbour, the inhabitants in the Strath with imported materials. At that time a very few spirited individuals in Dundee proposed the formation of a railway across the Sidlaw range of hills into Strathmore. They conjectured, and they conjectured aright, that if this railway was formed before, or at the same time with the principal railway along Strathmore, the traffic of the country would descend to Dundee, the nearest sea-port, where the numerous and varied shipping which frequent its harbour, would afford facilities of transport far superior to the harbour accommodation at Arbroath, Montrose, or Perth.

It was a bold spirit which contemplated the surmounting of the Sidlaw Hills by a railway, but the contemplation of it was not bolder than the execution of the work. Our very ingenious friend, Mr Charles Landale, civil engineer, was appointed to survey the best line of road, and after a most careful and accurate survey of two lines which he made, he gave the decided preference to that by the Glack of Newtyle. Although at the time when this railway was constructing, the Stockton and Darlington railway was the only one which was in existence on the same principle, the workmanship of the Dundee and New-

tyle one is very superior to any one even now in use. The using of large stone-sleepers to support the rails, the placing the rails high above the horse foot-track out of the reach of mud, and the peculiar mode in which the rails are keyed into the iron chairs, which prevents their starting up, are peculiarities and superior modes of workmanship on railways which were first exhibited here. Indeed, on the whole, this railway is a piece of work, both as to the direction of the line and the style of the workmanship, that reflects the greatest credit on the professional talents of the engineer. The completion of it has knocked, for the present, the projected one from Arbroath to the Strath completely on the head.

The hilly nature of the ground lying between Dundee and Strathmore, which causes the turnpike road to pass at an elevation of 500 feet in 11 miles, rendered the formation of a level line of railway impracticable. But where a continual traffic is to take place on a railway in both directions, it is absolutely necessary to render the road level to equalize the draught upon it. The nature of the ground is fortunately favourable to this disposition of things. There is as much level road obtained as is practicable under the circumstances, and these level plains are connected by inclined planes. In the distance of 10 miles from Dundee to Newtyle, which completely surmounts the Sidlaws, there are two long level lines and three inclined planes of railway. Stationary steam-engines are fixed at the top of each inclined plane, to draw the waggons up and let them down, and horses for the present are employed to draw them along the levels. The level spaces are so constructed that they each form two straight lines, with the view that should it afterwards be thought expedient to adopt stationary engines instead of horses, they could be erected at the meeting of the straight lines for the dragging of waggons along the levels. The rails were also formed of such a strength along the level lines as to bear the transit of locomotive steam-engines.

In the prosecution of this work difficulties had to be overcome at different points. One difficulty was the passing over the moss of Auchterhouse, the moss in which has always been of so soft a consistency that no cattle could walk across it. The passage over it was accomplished by digging the moss to a considerable extent on each side of the railway, and throwing it up in

the shape of an embankment, upon which the railway is placed above the ordinary level of the moss. The large ditch thus formed on each side of the railway not only dried the moss upon which the railway rests, but it has drained the bog for a considerable distance on each side; so that corn and grass may be seen growing where they never did before. The slopes of this mossy embankment are planted with trees appropriate to their situation, such as willows, poplars, spruces, and alders.

Another difficulty occurred at the forming of the inclined plane at Balbeuchly. Here the great hollow in the fields had to be filled up to the height of about 40 feet above the ground; and this great embankment was formed of travelled rubbish. To obtain materials for filling up as near to the spot as possible, a portion of ground at the top of this inclined plane was removed, which had the effect of keeping down the height of the level over the bog of Auchterhouse, and affording space for the engine-house.

A third and the greatest difficulty occurred in cutting the tunnel through the eastern acclivity of the Law of Dundee. The greatest portion of this hill is composed of greenstone and greenstone porphyry, a stone well adapted for the paving of streets in towns. It was reasonably expected, that the sale of the larger blocks of this rock for paving stone, and the smaller for broken stones for roads, would have realized as much cash as would have paid the expense of mining the tunnel, while the rock itself would have formed a natural archway. But, as Burns truly says, "the best laid schemes of men and mice aft gang agley." After penetrating a short distance at both ends of the tunnel, it was unfortunately discovered that the line of it had been accidentally fixed between two walls of a shift in the trap-rock, and the fissure had been filled up from below with a soft steatitic rock, in a highly disintegrated state, quite unable to withstand the process of mining. Under these unfavourable circumstances the tunnel had to be lined up on both sides with walls, and arched over with freestone and mortar. Thus, instead of realizing the reasonable anticipations of a saving of expense, the formation of the tunnel incurred an extraordinary outlay.

The part of the ground on which the rails were to be laid was first ballasted with hard materials, to prevent the sinking of

the large stone-sleepers which were to be laid on it. The stone-sleepers were then laid, and placed so high as to support the rails quite clear of the ground. On all the hard parts of the ground the stone-sleepers were laid at once, but on the spaces which had been filled up, wooden sleepers were first laid down, to give time to the travelled earth to subside. Upon each stone-sleeper was placed a cast-metal chair, 7 lb. in weight. The chair is fastened to the sleeper with two iron pins driven into wooden pegs, inserted into holes in the sleepers. The pegs are immersed in tar, and not too tightly fastened in the holes, in case that a concussion upon the chair should rend the sleeper. The chairs are placed three feet apart. The rails are made of the best malleable iron: they are 15 feet in length, $2\frac{1}{4}$ inches in breadth, and weigh 28 lb. per lineal yard. At the junction of their ends, they overreach sideways in one chair, so that the waggon-wheel passes to the one rail before it leaves the other, which prevents their starting up from the chairs even should any of the keys drop out accidentally; and this contrivance also permits the expansion and contraction of the length of the rails by the vicissitudes of the weather, without the risk of a space being left between the ends of the rails. The rails are tightly fastened to the chairs by means of double keys which are driven in in opposite directions, and they are placed five feet wide, outside measure. The whole railway is a single road, but for conveniency of passage, there are two sidings in every mile of 80 yards long each. The inclined plane at Dundee alone has a siding upon it.

It has been already observed, that the inclined planes are worked by stationary steam-engines. The waggons and carriages are drawn up and let down the incline by a rope three inches in diameter. The rope passes over metal pulleys and cylinders set about 20 feet apart. It is wound round a large drum of 12 feet in diameter, which is under the command of the engineer by a powerful drag. This drag, in its present construction, is apt to get overheated; but means, we believe, are under contemplation to check the downward speed of the carriages by a principle which is founded on the incompressibility of water. The steam-engine at the Dundee inclined plane is a high-pressure of 20 horse power, made by Messrs Maudesly & Co.

There being a siding on this incline, the engine works a

double rope, and as this has the steepest inclination of the three, the ascent of waggons at the same time moderates the speed of the descending weight. At the place where the waggons pass on this incline, the rope is of course bent out of the straight line, and it is kept in that position by a sheave of metal of a conical shape, revolving on its longitudinal axis. The engines at the other inclined planes are of low-pressure, and they were made by Messrs Meldrum, Dundee Foundry. A telegraphic board is placed at the bottom of each inclined plane, to announce to the engineer at the engine that the waggons or carriages are ready to be hauled up; and in thick weather a large bell is rung. A lantern could be used at night, but it is thought inexpedient to use the railway after night-fall for the present.

The service-waggons are made of wood or plate-iron, we believe the latter are preferred. They discharge their contents through the bottom. They are placed on a frame-work, supported on four wheels of cast-metal, 35 inches in diameter, and they weigh about one ton each, and are intended to carry a burden not exceeding two tons. They are fastened together by a strong iron bolt passing through eyes in bars of iron, and at the inclined planes they have precautionary safety-chains attached to them. They have each, besides, a drag, like a hammer-headed lever, which operates on the tires of the fore and hind wheels at the same time. Four waggons loaded, of a gross weight of 12 tons, is one horse draught; and he can walk away with this at the rate of at least three miles in the hour. Carriages for the conveyance of passengers are made of various forms, but they all move on the same kind of wheel as the common waggons.

There are close-bodied coaches, open vehicles with awnings, parcel waggons, and covered carts with benches, for poor people on market days. One horse trots with a number of them together at the rate of eight miles in the hour. Once we were conveyed along with sixty-four passengers by one horse at that rate. The motion in riding is not so smooth nor so noiseless as one might imagine; but this may be owing to the rails being placed on hard stone-sleepers, for on those parts where the wooden sleepers have not yet been removed, the motion is much smoother. The drag on these carriages gives the coachman complete command over them, even on going down the Balbeuchly inclined plane, which is, however, the gentlest. A guard always

accompanies the passengers to collect the money, and to place the swatches properly at the sidings.

There are depôts for the reception of goods erected at several places. That at Dundee is the largest. The sheds there can contain an immense quantity of goods, ready packed in the waggons; and there is a very convenient structure, like a wooden bridge, from the platform of which the carts of coal and lime from the shipping can empty their contents at once into the waggon placed below to receive them. It was in contemplation by the Railway Company to carry the rail-road to the harbour, by which the waggons could at once be loaded from the ships' side or from the warehouse. This arrangement would have saved the expense of cartage altogether, and it would have prevented the breaking down of the lime-shells and coal. But it seems the present magistracy in Dundee will not allow the railway to cross the streets, as the waggons might interrupt the regular thoroughfare, and carriages might be injured in passing over the rails laid in the streets. The magistrates, in the protection of public interests, may have some good latent reasons for preventing the extension of the railway to the harbour, and which they may make manifest at some future convenient period; but if their reasons are no better than those stated for them, they are quite fallacious. A horse and four waggons will measure in length no more than a double-horse cart or carriage, and they are much shorter than any cart-load of timber, or stage coach with four horses. Rails can be laid in a street to be much less sensibly felt on crossing them than most of the holes which may be seen in an ill-paved one.

The next largest depôt is at Newtyle. The building is divided into compartments which can each hold 130 tons of coal or lime, and which let at present for L.10 a-year. A weighing machine is placed both here and at Dundee; and it is so conveniently situate, that the waggons move onwards from the railway upon the machine, while the shank of the steelyard is placed in the inside of the counting-house above the desk belonging to the clerk of the works, who can ascertain the weight of the contents of the waggon in an instant. The weight of the waggon itself is painted on it. There are smaller depots at Baldragon and Auchterhouse, which are convenient deposites for lime, coal, or manure until they can be taken away at leisure.

Where the rail-road interfered with a public road, either in cutting down or filling up the earth, a bridge was cast over the railway in the one case, and an archway over the road in the other. Ditches are formed along the roadway to carry off the surface-water quickly. Walls of freestone and mortar have been substantially built against the banks of earth where excavations have taken place, and curb-stones have been placed in a diagonal direction across the inclined planes to intercept the water when it cannot obtain a quick passage over the side of the roadway. The horse-track is paved with broken stones, which are blinded with gravel. The rails having been kept $1\frac{1}{2}$ inch clear of the ground, the horses feet are not liable to throw small stones or mud on them.

The finished state of the railway presents us with these results. The depot at Dundee is 84 feet above the low-water mark at spring tides in the harbour. The first inclined plane, then, rises from the depot in the Ward to the east side of the Law, 244 feet perpendicular height, along an inclination of 760 yards, at the rate of 1 in 10; then the tunnel is passed through in 400 yards. A level road stretches beyond that 4 miles 1169 yards, across the Dighty Water, to the foot of the Balbeuchly inclined plane. This plane rises a perpendicular height of 200 feet, along an inclination of 1690 yards, or 1 in 25. Another level road then runs along a distance of 4 miles 261 yards, to the top of the inclined plane at Newtyle. This level has an imperceptible rise of 3 feet 9 inches in the last two miles, or 1 in 2816 feet towards the top of the Newtyle incline. This level is also the summit-level of the railway, which is 532 feet above the low-water mark of the spring-tide at the harbour of Dundee. The Newtyle incline falls a perpendicular height of 244 feet in 1025 yards, or 1 in 12. Newtyle depot is thus 287 feet above the low-water line at, and $10\frac{1}{4}$ miles distant from, Dundee.

This great and efficient outlet having been completed, the farmers in Strathmore have not been backward in taking advantage of it. Instead of sending their grain in their own carts to Dundee, they send it only to Newtyle, whence it is quickly transported into the town; and in return coal, lime, and manure are brought out on their account to the depot at Newtyle. Short as the time is since the railway was opened to the public traffic, more lime, coal, and manure have been carried out to St

more in that time than at any former similar period. Many will lime and manure their land, and consume more coal in domestic comfort, to a much greater extent than formerly, as they can now obtain these materials at a short distance, for the payment of cheaper carriage, than they could accomplish with their own carts on a long journey, to the neglect of the necessary work at home. The increased demand for these necessary materials on a farm, is one of the most immediate and obvious advantages of this railway. It is difficult to anticipate the future demand for these materials, but we have data on which a calculation may be made. We have allowed 5000 acres for bare fallow, and they will be limed with not less than 30 bolls per acre, which will give 150,000 bolls, or 25,000 tons. There are 4427 families in the district; of these three-fourths, or 3320 families are of the labouring classes, who will not consume, when they can easily obtain them, less than 2 tons each of coal for domestic purposes, 6640 tons. Farmer's families will amount to 553, and they will consume 5 tons per annum for domestic and other purposes, 2765 tons; and suppose there are as many families, 553 of the gentry, and the highest class of farmers, who will consume 10 tons each per annum, 5530 tons; in all 14,935 tons of coal per annum. Of manure, it is no extravagant supposition, that 5 tons per acre more will be laid on the fallow land than at present, which will make 25,000 tons in all. Besides that more bone-dust will be imported into the district for the raising of turnips than at present. Last year about 6000 quarters of bone-dust were imported into Dundee, of which the large proportion was sent into Strathmore.

Another immediate benefit derived from the railway is the opening of extensive quarries of beautiful freestone and pavement, which abound in the Sidlaw hills. The Earl of Airly already derives a rent of L. 200 or L. 300 for a new quarry at Pitpointie. Lord Wharncliffe very generously gave the use of the quarry at Pitnappie to the Railway Company, and out of which the stone-sleepers were taken for the rail-road. The company now rents it at the moderate sum of L. 50 a-year. Sir John Ogilvie has opened valuable pavement quarries at Baldovan, and so has Mrs Knight at Scotstown.

The prospective advantages of the railway to Strathmore, should it is extended along that great valley, are highly

important. The woods of Glammis, Lindertis, and Pitcur, will be opened up to the markets. There barrel-staves may be made in numbers sufficient to supply all the herring-fishery; and pit-props may be obtained without numbers for the coal-districts. At present 6d. per cubic foot is charged for the carriage of timber from the Strath, and it is the best timber only that can afford to pay such a price. The fine blue slates for covering houses will be brought down with ease from the quarries at Newtyle, near Dunkeld; and one great ship-building market will be opened to the inexhaustible stores of large timber in the woods of Dunkeld and Atholl. The agriculture of the Highland glens will be much improved by liming; Strathardle, Glenericht, Glenshee, Glenisla, and numerous other fertile districts, will be highly cultivated by the free use of lime and manure, and should ever limestone be discovered among the mineral treasures of the Grampians, which have never been sufficiently explored, coal will be wanted to prepare the limestone for use. That expensive fuel peat will be no longer dug out of its bed when the more economical coal can be obtained at a moderate cost. Pork will be fattened in the interior of the country in increased quantities, cured at the villages, and sent to the seaports to be shipped. Potatoes will be cultivated for shipment to a distant market-town, the soil in the neighbourhood of which may not be well adapted to their growth. Turnips and straw will be sent into the large towns by the farmers to the cowfeeders, and manure obtained in return. Nay, thrifty housewives in the country will send their sweet-milk, butter, eggs, and poultry *daily* to the towns. Facility in the conveyance of the produce of the soil will economise the labour of farms. When grain can be taken to market by the railway from the very barn-doors, fewer horses will be required to till the land; for the time they formerly spent in drawing the grain to market will be devoted to the cultivation of the fields. Hence, one pair of horses, with all the concomitant appendages of ploughman, implements, and harness, will be relinquished out of every five pair employed in the district. In short, the effect of a speedy and cheap communication will be to enhance the value of landed property in Strathmore and in all the adjoining glens, by virtually bringing them nearer to the large, populous, and vastly thriving town of Dundee. That this opinion is not sin-

gular, we may mention that when subscriptions were solicited in support of the projected railway, and a proprietor of land in the neighbourhood of Dundee was particularly requested to subscribe to it, he replied, "I am not so foolish as to assist in bringing Strathmore so near to the end of the town of Dundee as my own property."

Hitherto we have considered the operations on this railway as they affect, and will affect, Strathmore in an agricultural point of view, and that these effects will be beneficial, is no extravagant anticipation, though they should not be realised to the extent which we do anticipate. But we should also notice their probable effects on the trade of Dundee, as a shipping-port, and the commercial relation of the Strath in regard to it as the seat of a particular kind of manufacture.

Dundee is the great emporium of the coarse linen manufacture of Scotland, and being the emporium, many hands are employed in that manufacture by her merchants, in all the towns and villages for many miles round. The towns of Forfar, Brechin, Kirriemuir, and Cupar in Angus, and all the inhabitants, male and female, in the villages in Strathmore, who are not directly employed in husbandry, devote their labour to the manufacture of this coarse linen, which is exported to all parts of the world, in ships belonging to many of the ports of the kingdom. The greatest proportion of the yarn of which this linen is made is spun by machinery in Dundee; and expensive as the cost of any thing in a large town is, in which the municipal taxes must be always high, it is found expedient, for want of hands, to drive this yarn in carts to these distant towns and villages, and bring back the webs in carts after they are woven. Part of this yarn is bleached to make a particular kind of linen, and for want of a sufficient quantity of clear water near the town, it is sent as far, in some instances, as twenty-eight miles to be bleached, and brought back again the same distance to be weaved. All this heavy cartage must be expensive, so that we need not be astonished to hear that a web costs 4d. to carry it from Kirriemuir to Dundee.

Now, this heavy charge of carriage has the effect of lowering the price given to the weaver for the weaving of the web. At last the manufacturer, feeling that he has large and unavoidable outlays for carriage which he cannot control, he is tempted to

drive a hard bargain with the weaver. Could this heavy cha be by any means much reduced, the cost of the web to the m chant would be reduced without the lowering of the wages the weaver. It is in this way only that a reduction in the c of production will not cause a corresponding reduction in wag It may raise wages. This railway will assuredly reduce t great expense of carriage. The web may perhaps be broug by it for 2d. instead of 4d., perhaps even for less. Again, th are a great many small rivers which descend from the Gra pian mountains, and at present waste their usefulness in m murs, but which, if properly dammed up, would supply the m economical species of moving power for spinning machinery. Fl could be sent by the railway conveyance to these mills to spun: the yarn could be woven into webs on the spot, and t finished manufacture could be carried to the shipping port the same expeditious, and *therefore* cheap means. Farther part of these same waters could be applied to the purpose bleaching the yarn for the manufacture of white linen. A the manufacturers, distillers, and flour-millers, would dispen with horses and carts as a means of conveyance.

It is therefore obviously the interest of the commercial peop in Dundee to extend this undertaking, so that it shall not r main cut off in both directions as it is at present. The great, tl apparently insurmountable difficulty,—the crossing of the el vated Sidlaw range—having been overcome, at a great sacrifi of capital. Its estimated expense was L. 27,000 without tl tunnel; but what with the unexpectedly great and really pr voking expense of the tunnel, and the desire of the company finish the work substantially and beautifully, the capital no expended is, we believe, above L. 60,000, and this large su has been advanced by comparatively a few individuals. St much remains to be done to make the railway as efficient as can be. It must be taken down to the harbour, and some mea of conveyance, if not a railroad, must be established in ramifie branches through Strathmore to Glammis, Forfar, and Kirri muir, on the one hand, and Meigle, Cupar-in-Angus, and Blai gowrie on the other, and thence perhaps towards Dunkeld, onl a few miles farther.

The following table shews the traffic on the railway since was opened.

TABLE exhibiting the Amount of Tonnage which passed North and South on the Dundee and Newtyle Railway from February to 31st September 1832.

	Feb. & March.		April.		May.		June.		July.		August.		September.		Total.
	North.	South.	North.	South.	North.	South.	North.	South.	North.	South.	North.	South.	North.	South.	
I. *Agricultural Commodities.*	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Lime, -	24 13	—	189 4	—	433 12	—	444 8	—	500 3	—	673 4	—	381 8	—	2646 12
Coals, -	273 9	—	182 17	—	199 12	—	291 8	—	411 13	—	876 10	—	195 19	—	2431 8
Grain, -	16 13	187 5	3 15	46 18	16 3	53 15	2 2	23 3	10 17	30 6	44 11	5 13	30 11	58 10	530 2
Potatoes, -	—	73 2	—	39 3	—	14 8	—	9 8	—	2 8	—	—	—	2 16	141 5
Manure, -	20 0	—	24 13	—	27 0	—	—	—	98 8	—	30 19	—	313 6	—	514 6
Hay, -	—	0 3	0 12	0 13	—	2 6	—	1 9	—	0 4	—	1 14	—	2 9	9 10
Bone-dust, -	—	—	—	—	32 0	—	42 10	—	5 10	—	—	—	—	—	80 0
Calves, -	—	—	—	—	—	0 1	—	—	—	—	—	—	—	—	0 1
Malt, -	—	—	—	—	—	1 1	—	6 9	—	1 10	—	6 17	—	2 11	18 8
Meal, -	—	—	—	—	—	—	—	2 8	—	1 8	—	—	—	0 9	4 5
Flour, -	—	—	—	—	—	—	—	—	—	—	1 13	4 2	4 9	1 0	11 4
Swine, -	—	—	—	—	—	—	—	—	—	—	—	—	—	0 8	0 8
Timber, -	1 12	43 19	3 14	4 0	10 16	14 1	9 9	11 13	15 12	4 10	2 11	40 18	25 0	0 9	188 4
II. *Commercial Commodities.*															
Merchandize,	29 17	1 7	12 8	2 8	20 3	1 19	19 1	2 16	5 3	0 10	11 6	5 8	46 5	8 14	167 5
Stones, -	—	42 16	—	323 2	—	715 6	—	909 6	22 9	906 1	8 11	704 5	329 9	546 0	4507 5
Cloth, -	—	1 7	0 3	0 11	1 6	0 15	—	2 17	—	10 10	—	8 19	—	1 1	27 9
Iron, -	1 13	—	9 17	—	5 5	—	3 18	—	4 14	—	12 11	—	4 14	—	42 12
Flax, -	—	0 2	—	—	21 4	—	13 12	—	—	—	21 2	—	—	—	56 0
Yarn, -	—	—	2 15	—	10 6	10 7	15 15	13 11	13 7	7 5	9 12	3 7	24 8	—	110 13
Tow, -	—	—	—	—	33 2	—	9 4	—	5 15	—	—	—	4 19	—	53 0
Cinders, -	—	—	—	—	3 10	—	—	—	—	—	8 12	—	—	—	12 2
Bricks, -	—	—	—	—	0 7	—	37 12	—	—	—	2 1	—	—	—	40 0
Hemp. -	—	—	—	—	—	—	3 15	—	—	—	2 0	—	—	—	5 15
Slates, -	—	—	—	—	—	—	—	18 3	—	4 2	—	6 0	—	—	28 5
Total,	367 17	350 1	429 18	416 15	814 6	813 19	892 14	1001 3	1093 11	968 14	1705 3	787 3	1360 8	624 7	11625 19

Passengers per Coaches in		December 1831,	417
----	----	January 1832,	882
----	----	February,	1031
----	----	March,	1451
----	----	April,	2645
----	----	May,	3156
----	----	June,	4284
----	----	July,	4363
----	----	August,	4684
----	----	September,	3220
		Total,	26133

It is necessary to give some explanation of the small quantity of lime which has been used in Strathmore this season, July is the most convenient month for the farmer to drive lime for his fallow, and in that month there was less taken than in August. The apparatus which was used at the depot at Dundee for the lading of the waggons was very inefficient in its opetation, particularly in the matter of celerity. It was just a crane which hoisted up a box that occupied a hole in the ground, and into which the carts emptied their contents as they brought them from various quarters. With this slowly operating machine, the workmen were not able to fill the waggons so fast as the request for lime alone required, though they worked from daybreak to eight o'clock at night. In August this crane was laid aside, and the more expeditious method of the wooden-bridge alluded to when speaking of the depot at Dundee, was adopted, upon which the carts passed and emptied their loads at once into the waggons placed below for their reception; and in that month, accordingly, 173 tons passed along the railway more than in July; but August was too late for driving lime for fallow-land. There was no time to lay it on the land when the harvest was expected immediately. Many, therefore, gave up the idea of liming for this season. Such an occurrence, however, cannot take place another year. But nothing marks so strongly as this circumstance, the inconvenience to the community which the refusal to allow the railway to be carried down to the harbour has created.

There is no other mode of carriages surmounting the angles of elevation on a rail-road, than by the assistance of stationary steam-engines, for as to locomotive engines, they cannot at all

nd an elevation of 1 in 12, and they cannot exercise an al-
t perceptible power of 1 in 50. To ascend a railroad of
elevation, it requires a power 21 times greater than to sur-
nt a similar elevation on a common road. The level part
he railway has hitherto been served by horse power; and at
outset of such a work as this, when the business upon it
to be acquired, and no certain anticipations of great im-
liate traffic could be depended on, it was highly expedient
to incur the expense of locomotive steam-engines. As the
ngth of the rails is only 28 lb. per yard, it is very question-
whether that strength could have borne the locomotive
ines which were first used, especially such as those used on
Liverpool and Manchester railway, which weigh from 6 to
ns each, and are borne on a rail of the strength of 36 lb.
yard. Under these circumstances, Mr Nicholas Wood, the
nent colliery surveyor at Killingworth, recommended the
ght of carriages with the goods not to exceed 3 tons each,
that they should be propelled by horse-power. In this
ner the business of the railway has gone on hitherto very
othly, one horse dragging along four loaded waggons of 3
each, at the rate of perhaps more than three miles per
r. The rate of freight is 4d. per mile per ton.

Now, however, that locomotive engines are improved in their
struction, and the economy in their consumption of fuel
ns to be brought down to the minimum point, it is worthy
immediate consideration, whether they should not be em-
ed on this railway in preference to the horses. The two
l plains would require an engine each. The light engines
Mr Gurney's construction could work upon them with great
antage. But as example is better than precept at all times,
particularly in matters of experiment, we shall state what
of Mr Gurney's locomotive engines performs on a railroad
Wales. Mr Crawshay of the Cyfarthfa iron-works in Gla-
ganshire, South Wales, states in a letter to Sir Charles
ce in February 1832, that the engine which he got from
Gurney for his railway at Hirwain, did not weigh above
wt., including water and fuel, and every other thing in a
king state; that this engine conveyed, between 1st January
1 and 1st January 1832, of coal, ironstone and iron, from

20 to 30 tons at a time as suited convenience, exclusive of the weight of the carriages on which they were drawn, 42,300 tons, a distance of $2\frac{1}{2}$ miles; that during that time the engine was half idle, though it was kept "working idle," as he expresses it, in order to keep the boiler full; that the quantity of coals consumed in that time was 299 tons at 3s. per ton, L. 44, 17s.; that the wages of the engineer was L. 52, and those of a boy L. 15, 12s.; and that with oil * and other trifling matters the whole expense amounted to L. 112, 9s., or *less than one farthing per ton per mile for the goods conveyed*; and that from his long experience of horse power on railroads, he conceives that steam power is cheaper than it, in the proportion of 1 to 20 or 30. He concludes by earnestly recommending the cheaper power of steam, *wherever practicable*, for that of horses, and says there are "many other valuable considerations in favour of that of steam, known only to those who have large and expensive stable

* The following letter, which is copied into the Repertory of Inventions from the Journal of the Franklin Institute, an American publication, may prove of interest to railway proprietors.

"There is no difficulty in oiling axles continually, but to do it so as not to waste a drop of oil, has not been done, I believe, till the latest improvements in the friction-saving carriage of the Baltimore rail-road, where very accurate experiments have been making by Mr George Brown, one of the principal proprietors in that work; the result of which, he informs me, is, that one quart of oil will be sufficient for 2000 miles run of a carriage, which, with its load, weighs three tons. He informs me at the same time, that he has ascertained, that the Lehigh railway carriages consume four quarts in running 821 miles with one ton. This you will perceive is nearly *thirty times as much*. The manner of oiling the Winan's waggon is peculiar to its construction as now improved. The secondary wheels now run in a cast-iron case, the top of which is formed so as to affix to the under surface of the side timbers of the frame of the waggon. Its sides sustain the axle, and are supported or joined by an intermediate part or bottom, which forms a tight case, into which the oil is put, so that the friction-wheel dips into it, and its rim carries up a little of it continually to the rubbing and rolling surfaces, returning it to the reservoir, thus oiling its own axle where all the rubbing is situated, and the rolling axle, and no more is *consumed* than *evaporates*. Its inclosure keeps it perfectly clean. I need not remind you that the use of oil on axles is not only to keep the surfaces from absolute contact, and grinding together, but to keep them cool, and this is better done by the successive application of new portions of oil, than by keeping the same oil on the axle as long as it will last, partaking of the heat the axle acquires, and therefore evaporating the faster. This method must therefore be of consequence when great velocity is to be given to heavy loads. J. I. SULLIVAN."

establishments, in which valuable horses, after sustaining hard work all day, are exposed to the negligence, roguery and ignorance of hawkers, horsckeepers, and farriers; while the engine having completed her day's work, may be left without anxiety as to the attention of any of those notoriously troublesome persons until again called into use *."

In this statement it will be observed, that coal is used to raise the steam instead of coke which is the ordinary best fuel to preserve cleanliness in the conveyance of passengers. Coal is cheaper than coke by about one-third not only in price, (and in Wales coal appears to be much cheaper than it can be obtained in Dundee, where it is perhaps not less than 9s. per ton); but it will raise double the quantity of steam to coke. But coal cannot be used at the Newtyle railway on which many passengers travel every day, and there has not been any mode discovered of consuming smoke in locomotive engines. Indeed, that is a difficult process any where. The black particles of soot are mechanically suspended in the smoke, and they are constantly surrounded by a large volume of carbonic gas, which prevents their combustion. Mr Gurney, however, states in his examination before the Committee of the House of Commons on steam-carriages, that the carbonic gas may be got rid of by passing the smoke through a mixture of sand and quicklime, but such an apparatus is far too heavy for a locomotive engine. He therefore always uses coke, which is consumed at the rate of from a quarter to a half bushel per mile on common roads.

* The advantages of increased communications through a country is strikingly exemplified along the course of the Stockton and Darlington Railway. When that railway was formed twelve years ago, it was said that it would never be of benefit to the community. Let us, however, contemplate the following facts: Within these twelve years, by virtue of this railway, 6000 people have been added to the population of the district. Not fewer than 700 ships enter the Tees every week, where that number would not have been seen in six months The coal trade in the district has increased 250,000 a-year. And what is perhaps the most important fact, may be derived from the evidence of Mr Brandling before the Committees of both House of Parliament on the Coal-trade. He stated, that, in consequence of the competition at Stockton, the coal-owners about Newcastle had not been able to sell their coals in 1830 by 2s. or 3s. per chaldron as they had received in 1828. The quantity of coals shipped annually from the Newcastle coal-field is 4,500,000 chaldrons. A saving of 2s. per chaldron will give an annual saving of £. 150,000 to the communit-

The greater expense of coke than coal is one drawback to the use of locomotive engines on this railway, which must always convey a great number of passengers; but the much heavier load which an engine can drag at 10 miles per hour, to horses going 3 miles, shews the great superiority of steam to horse power, and business may increase to a rate which would not afford room for the number of horses that would be required. On the railway a light engine could run backwards and forewards on the same level with a single change of fuel and water. The fuel would be 5 bushels of coke at 40 lb. per bushel, 200 lb. and 8 cwt. of water. About a bushel of coke would be consumed in raising the steam at the first starting in the morning, and which can be accomplished by one of Mr Gurney's boilers in about 10 minutes. High-pressure engines must always be used for locomotive carriages, as the carriage of a sufficient quantity of cold water for a low-pressure one would be impracticable.

Apprehensions still exist in many minds of the continual liability of a high-pressure engine to burst. But the peculiar structure of the boilers of high-pressure engines made either on Mr Gurney's, Mr Hancock's, or Messrs Summers and Ogle's principle, renders it quite impossible that any danger can exist from the bursting; for when they do burst, which is very seldom, it is only in small fractional portions, which remain within the casing of the boiler, and the water runs into the fire and puts it out, so that the stopping of the engine is the only harm that can arise from it. Indeed so far from such a fracture giving one an idea of bursting,—an idea always associable with a loud noise,—it always takes place without the engineer even being aware of it, the carriage stopping giving the first notice of the accident. But the bursting of a boiler, such as it is, is not always caused by pent up steam, for it will take place when the safety-valve will be blowing away steam, under a pressure of 70 lb. upon the square inch. Mr Gurney says before the Committee, and he has bestowed great attention to this particular subject, that some new and unknown explosive compound is sometimes formed in the inside of the boiler. This is a new compound of oxygen, hydrogen and nitrogen, which, if exploded by any means, will burst the boiler at a much lower degree of

pressure than the proving of the boiler. He mentioned the existence of this new compound to Gay Lussac, who agreed with him that there was another compound of oxygen and hydrogen than that which formed water, though no other combination of these elements has been acknowledged in this country. Gay Lussac mentioned that at Paris they had succeeded in combining two volumes of oxygen with two of hydrogen, and that the compound was highly explosive. Mr Gurney believes that this new compound can only be formed at a certain high temperature, when the water is too low in the boiler, but never when the water is high. But to banish all fear of the boiler bursting from inattention to the state of the water, Mr Gurney has placed in certain parts of the boiler plugs of a fusible compound alloy of metal, which melts far under the temperature in which the explosive gas is formed. Indeed the following fact will shew that an explosive property is not necessarily a characteristic of an engine boiler. A common cauldron with an open top once burst with an explosion in Mr Meux's brewery in London. A film or crust had been formed at the bottom of the cauldron, and its temperature had thereby been accidentally raised. Some cause had broken this crust, when the liquid which came in contact with the heated bottom of the cauldron, was driven off suddenly in a gaseous state and caused the explosion. Mr Gurney's boiler can be easily cleaned of any incrustation on its pipes.

Nor are the passengers annoyed by the steam which is expelled in the working of a high-pressure engine. Instead of using fans to blow the fire, Mr Gurney causes the waste steam to pass through a double-bodied box like the compartments in a smith's bellows, in the shape of gas jets, which constantly play in the throat of the furnace funnel into which it passes up, and which cause a draught of air through the fire, sufficiently powerful to dispense with the labour of blowing. This is a very ingenious and beautiful contrivance. On the whole, there is not the slightest danger or annoyance in being dragged in a separate carriage by one of Mr Gurney's locomotive engines.

But a more important consideration for the company, than the substitution of locomotive engines for horses upon the levels, is the extension of the means of conveyance through Strathmore. Great as are the advantages which the farmers on the

northern margin of the strath have already derived from the erection of the depot at Newtyle, their facilities for improvement would be increased to an incredible degree, were a quick and cheap means of conveyance brought to their very doors. There are two modes of applying these means of conveyance, by an extension of the *railroad*, or by locomotive engines on the *common road*.

A survey and report have already been made by Mr Wood, with the view of extending the railroad to Glammis on the east, and to Cupar-in-Angus on the west, and the estimated expense is L. 20,000. In this estimate Mr Wood was assisted considerably by the data which Mr Stevenson's Report to the county of Forfar, formerly alluded to, afforded him; and he considers such a railway would be advantageously occupied by locomotive engines. But should the railroad stop at Glammis and at Cupar, and not proceed to Forfar and Kirriemuir on the one hand, and to Blairgowrie on the other, the manufacturing population of these towns, which is very considerable, would feel little interest in promoting the welfare of the railway; and yet if the railroad was extended to these places, the expense of it would be very considerably above the L. 20,000. The present company could not be supposed to advance so large an additional sum, in a short time; and it will be a pity if they shall not derive much benefit from their present enterprise.

But why not start locomotive-engines on the common roads, until capital were obtained for the formation of a railway, if, at a future period, it were found at all expedient to form one? Much experience has of late been obtained of the practical utility of these engines on the common roads of the country. The ascending up of hills was long a bugbear to these machines, but it is now found that they can ascend a steep hill of a rise of 1 in 6, with the power applied to one wheel only. They can sweep along a level part of a road at the rate of 33 miles an hour, with as many passengers upon them as on a four-horse stage-coach. Messrs Summers and Ogle's steam-coach, which travelled lately from Southampton to Liverpool, effected that speed, and climbed that inclination. These extraordinary feats were not made with a view only to exhibit a high rate of travelling, but also to prove, that with the steam at the extraordinary

pressure of 247 lb to the square inch, the steam-carriage was completely under command.

As the friction of the wheels upon a macadamized road is not great, it is necessary to fix the minimum weight of a steam-coach, the wheels of which will not slip round. Three tons, independently of the weight of passengers upon them, or the carriage which is dragged behind, is the least weight which a steam-coach with water and fuel should have. Such a coach, however, cannot draw or carry more than a weight equal to itself, upon a common road, at a great speed. Its power is increased either by increasing the diameter of the cylinder, or lessening the diameter of the wheels, when it will draw 11 tons upon a common road at the rate of five miles per hour. In this respect the railroad shews a vast superiority to the common road, as a medium of transit. On it, a locomotive engine can drag fifteen times its own weight at a high speed. Still steam power contrasts favourably with horse power on common roads. A stage-coach of 3 tons weight, with the passengers, requires four horses to go ten miles an hour. The same weight of coach and passengers could be conveyed the same distance by steam in half, or even a third of the time, at about half the cost. It is a remarkable property in the power of steam, that it will propel at the rate of 30 miles an hour with the same quantity of fuel, and of course cost, as at five miles an hour. Hence it is advantageous to travel these steam-coaches on common roads, at high rates of speed; for though they cannot drag at one time more than a weight of people or goods equal to their own weight, yet, being able to carry them a great distance in a short time, they can run many trips in one day, at no additional cost.

These steam-coaches will of course run best on the best made [illegible] with the ordinary macadamized turnpike-roads which [illegible] and they are very hard, being metalled with the [illegible] every part of the country is quite well adapted [illegible] them, particularly if the carriages do not carry passengers or [illegible] upon themselves, but in a separate carriage which is [illegible] behind. This is the manner which Mr Gurney pre[illegible] his coaches. This independent mode would be the [illegible] enient for conveying goods along the common roads [illegible] Railway, as the bodies of the waggons carrying

the goods along the roads, could be craned on the carriages which are adapted to the railroad. With regard to the conveyance of passengers, coaches of the construction of those of Mr Hancock, or Messrs Summers and Ogle, might be obtained if preferred. These steam-carriages are not objects of terror to horses passing them. Steam-coaches do little harm to roads, for their wheels are made completely cylindrical, at least 5 feet in diameter, and their tire varies from 3 inches to 4½ inches in breadth. Mr James Macadam considers these wheels would do no injury to a *hard* road, though they were loaded with a weight of 8 or 10 tons. Common stage-coaches are very detrimental to roads, not only on account of the narrow tires of the wheels, which seldom exceed two inches in breadth, but particularly of the horses' feet. The action of horses' feet when ascending a hill is like digging and shovelling, and in descending, like picking and scraping; so that they disturb the arrangement of the broken stones near the surface of the road. Mr Gurney estimates the damage done to roads by stage-coaches, in the proportion of five-eighths by the horses' feet, and three-eighths by the wheels. But the more accurate experiments made by Mr John Macneil, civil engineer, Daventry, fix the damage done to roads by atmospheric changes at 20 per cent.; and if coaches travel fast, the wheels only damage to the extent of 20 per cent., but that the horses' feet injure them 60 per cent.; whereas in the case of waggons which travel slow, the wheels damage 35.5 per cent., and horses' feet 44.5 per cent. Now, the wheels of a steam-coach being cylindrical, and broad in the tires, they must damage the road in a much smaller degree than those of a stage-coach carrying the same weight, independently of the greater damage done by the horses' feet. As other examples of the injurious effect of horses' feet to roads, we have only to look at the horse-track on railways, where the wear is sometimes so great, that proprietors frequently go to the expense of paving them, as on the railway between Cheltenham and Gloucester; and to the towing paths of canals, which are kept at great expense; moreover, a coach horse that has travelled 200 miles requires a new set of shoes, whereas a stage-coach runs 3000 miles before it requires new tires.

Our object in continuing so long on the damage arising to roads by stage-coaches and their horses, is to shew, that a high tollage ought not to be imposed on locomotive carriages, on common roads. On the contrary, they ought to pay less, as their wheels will actually benefit the road. But allowing them to pay a fair tollage, the principle which Mr Gurney recommends seems to be a very fair one. It is this: The average weight of a coach horse is 10 cwt., and though it does more injury to a road than the same weight placed on broad and high wheels would do, he would make a locomotive carriage pay as much as a horse's toll for every 10 cwt. which it weighs. Another principle of Mr Macneil is, to oblige steam-coaches to have a breadth of tire in proportion to the weight of the coach, and pay toll according to the breadth of tire. A general bill will likely be passed next session of Parliament, regulating the tolls of steam-coaches throughout the kingdom. Some shameful obstacles have already been thrown in the way of steam-carriages, of which the following is a very gross instance, and with which we will conclude this article, hoping that the petty rancour of a few interested individuals will not be able to check the progressive extension of the most *useful* application of the power of steam which has ever yet been discovered, and the very remarkable effects of which on the agriculture of the country, we will take an early opportunity of laying before our readers.

Last year, Sir Charles Dance run one of Mr Gurney's steam-coaches between Cheltenham and Gloucester, a distance of nine miles, which it did easily in fifty-five minutes, with passengers, and it travelled between these towns four times a-day. It ran for four months, and in that time carried 3000 persons, at half he ordinary coach fares. Some malicious people put an immense quantity of loose stones upon a hollow part of the road, o the depth of 18 inches, with the evident purpose of stopping r breaking the steam-carriage. It carried its passengers, however, over the stones, when the passengers of the stage-coaches were obliged to alight. By repeated passages over these stones the crank-axle of the steamer broke, and before it could be repaired, these same interested persons had the influence to cause Parliament to pass a bill to exact a heavy toll of 5s. at each bar

on this same road, on this same locomotive carriage. On the Ashburn and Totness road, 5s. per wheel was charged on steam-carriages. The drag-carriage, with its carriage for passengers, having eight wheels, would of course have had to pay at each toll-bar L. 2 of toll! Mr Gurney petitioned the House of Commons to institute an inquiry regarding steam-carriages. The petition was listened to; a select committee was appointed; these toll bills were repealed; and the mass of valuable information which their report gives to the world, on the stage-coaches and steam-carriages, on the public roads, is the happy result of their well-directed labours.

ENGLISH HUSBANDRY, AS PRACTISED IN A PARISH IN ONE OF THE MIDLAND COUNTIES.

(To the Editor of the Quarterly Journal of Agriculture.)

PRACTICAL remarks relative to the agriculture and situation of the husbandman in different counties, if not wholly instructive, may at least be amusing; and when the acquired principles, or rather the local circumstances which govern the husbandman of particular districts, are brought into view, the reasons for different practices are elicited, and perhaps some of the customs of one may be beneficially adopted by others.

The parish of which I am about to give a sketch is situated in one of the inland counties, above twenty miles from London. It contains about 4000 acres of wood-land, pasture, meadow, and arable land, the latter forming the greater portion; there are about 120 acres of outfield or common. Population between six and seven hundred, chiefly employed in agriculture. There are about twenty different farms, averaging about 150 acres each, all enclosed and divided by hedges, in which stand a good deal of fine timber. Three farmers only are proprietors; the rest hold under landlords at rents averaging nearly 20s. per acre. Tithe 5s. 6d. per acre. Poor-rate 4s. on the pound of rent per annum. Highway duty including statute labour, about 9d. in the pound.

The soil is chiefly a gravelly loam, lying on chalk at different depths from the surface. The face of the parish is a good deal varied; a valley with a small rivulet intersecting it, causing great diversity of soil. The declivities facing the west are rather abrupt, and except at the bottom very gravelly and near the chalk-formation, with here and there patches of clay which are generally wet. The brows facing the east are less precipitous, and the soil superior, being a pretty good friable loam. The circumstance of the eastern slopes being less abrupt and of better quality than the western sides of eminences, obtains very generally in the south of England, and perhaps is so over the whole island.

The diversity of soil and undulation of surface of almost every farm, occasions an extra expense to the farmer; because, he must keep horse-power enough for his heaviest and most hilly field, whether his other fields require such force or not. Every farmer, therefore, keeps a team of four good horses at least, with generally two odd horses, (one serving as a riding nag occasionally), of which in seed-time and harvest he can make with the regu lr team, two of three horses each.

To stock and crop such farms require a capital of L. 12 per acre. Sometimes they are cultivated with less, but the profits are always commensurate with the means of stocking.

The arable land is managed in a very uniform, and in many instances in an undeviating manner, on a five-course system, viz., 1*st*, fallow dunged and sown with turnips to be eaten off with sheep; 2*d*, barley with grass seed; 3*d*, clover, generally mown twice; 4*th*, wheat; and 5*th* oats, which finishes the course. Fallowing again after the wheat, and growing what oats may be wanted on part of the turnip land, would be a better system, as well for the farmers as the land, and of that every farmer in the parish is fully aware; but the old custom is continued, because there being but a very small proportion of meadow and pasture attached to each farm, enough live-stock cannot be profitably kept to make manure for *one-fourth* of the arable land in each year; though by good management enough may be got together to cover *one-fifth*.

There are but very few spots in the parish strong enough for beans; and pease are only occasionally sown on the wheat stub-

ble if manure can be spared for them. It is the poverty and gravelly nature of the soil which confines the farmer to the old course of proceeding, as described above.

Five or six cows are kept on each farm to fatten veal for the London market, for not a bit of butter or cheese is made in the parish, except for family use, and not much of that. A good cow worth 20 guineas, and well kept, will fatten off about two calves and a half; fresh calves being bought in at 25s. or 30s. each, as the first calves are sold off. A calf that thrives will be fat enough in about ten weeks, and then weighs about 18 stones of 8 lb., which, if well fatted, and white (in the flesh), will fetch, in Smithfield, from 4s. 6d. to 6s. per stone, sinking offal. Veal is sometimes cheaper, if sold at Christmas, because everybody then eats beef, or at Easter, when lamb only is in fashion, or when mackerel are plentiful, or again at Michaelmas, when nothing is relished but roast goose and pork. By this method of employing the milk of a cow, her annual profit averages, according to the opinion of the old farmers, about L. 12 per annum.

Two breeding sows are always part of the live stock. These supply roasters, porkers, and baconers, for the use of the market or use of the family. Roasters are fit for the spit when they weigh from 4 lb. to 5 lb., and generally sold at 1s. a pound. Porkers are fatted on barley meal, and when fit for market weigh from 4 stones to 8 stones, worth from 4s. to 6s. per stone. Pork for pickling are fatted to the largest size, but this is not much used in this part of the country. Bacon hogs are also fatted to the largest size, to even 30 or 40 stones. After having the run of the stubbles, beech mast, and acorns, they are put up, and at first fed with pease, or beans with a little barley meal; but at last fatted off with barley meal only, which makes the finest meat. Bacon, instead of having the hair scalded off like pork, has it singed off with blazing straw, and instead of being pickled in tubs, is cut up into flitches, hams, &c., and dry-salted in troughs, dryed in malt kilns, or in a large chimney, and afterwards kept on a rack in the farm kitchen.

Pork and bacon, with bread and beer, are the staple provisions in a farm-house, and but little else is used unless the family be large, when a lamb or a small sheep is occasionally killed, or a fresh joint ordered from the butcher for Sunday's dinner. Poultry

is not a profitable stock in this quarter; a dozen hens kept to run in the yard for their eggs, and half a dozen green geese bought in to clear the stubbles of corn, are as many as a farmer can profitably keep for the amusement of his wife or daughters.

Every farm has a small flock of a score or two of store sheep, chiefly ewes. These, as soon at they drop their lambs, are put on turnips, to get the lambs as soon as possible ready for market. But for the want of green pasturage this store flock is always limited; and as the arable land, poor as it is, carries occasionally fine crops of turnips, the farmer, in this case, either sells the turnips he cannot consume himself, to be eaten on the ground, at from L. 3 to L. 6 per acre; or, what is more usual, buys in, at some of the Hampshire fairs, a score of forward Wilts or Dorset ewes to eat his surplus turnips. These ewes begin dropping their lambs in the end of November, and in the course of December. This is a valuable flock, and the greatest care is taken of it; so that the whole ewes and lambs together may be all ready for market at Easter, or when the turnips are done. The lambs of these large breeds of sheep, when fat, weigh from 4½ stones to 7 stones each, and very often sell for as much money as their dams cost; so that the farmer has the value of a ewe weighing perhaps 12 stone, though of inferior meat, as the profit of his adventure.

Wheat is sometimes, though rarely, sown on a dunged fallow about the end of September. In the usual course it is raised on the clover ley. The finest white sorts are preferred, the ground not being strong enough for red wheat; the produce from 15 to 30 bushels per acre. 2½ bushels brined and limed are sown per acre, generally broad-cast, well harrowed, the furrows struck up, and cross-water furrows cleared out with the spade where necessary. When ripe, about the 1st of August, it is reaped by the acre, at prices varying from 8s. to 12s. Reapers find themselves in every thing. Reaping is usually performed by the cottagers with their families.

Oats are sown in February and March, often on a stale furrow, the ploughing having been done in the autumn or during winter. The common white potato, black Poland, small black, black and white Tartarian, are the sorts usually sown; one sack

per acre being allowed for seed. Produce from 24 to 63 bushels per acre, sometimes more. Oats never grow very high, and are always mowed with scythe and cradle, for about half a crown per acre, the mower finding his victuals. An expert hand, and there are many such in the parish, will cut 4 acres each day, so that the oat crop is soon cut down.

Barley is sown as soon as the turnips are eaten off, that is, any time after the middle of March, the ploughs following as the sheep move on. If the ground works kindly, one ploughing is enough, but if it comes up rough and cloddy, two or even three are not considered too much. The soil cannot be too much pulverized for the barley and the small seeds to be sown therewith. 3 bushels of seed to the acre; one cast before the harrows, another after the first tine*, and afterwards *bouted* athwart, finishing with a tine landways. Next a light roller is passed over, the clover seed (12lb. and rye grass ¼ of a peck to the acre,) is sown on the rolled surface, and covered by one tine of the harrows landways. Produce, from 20 to 30 bushels. Barley is mown with the scythe and bow, which is a pliable rod fixed to the heel and middle of the sned, to prevent the barley falling over behind during the sweep of the scythe. The latter is kept as close to the ground as possible, as any stubble would deteriorate the clover. The young broad clover rises sometimes nearly as high as the barley, and though this often retards the making of the barley, it renders the straw excellent fodder.

The common red clover is sometimes sown without intermixture, but it is usual to add 2lb. of yellow and 2lb. of white Dutch, making together 12lb. per acre, as well as a pottle of rye grass. The loam fields soon tire of broad clover, so that when it comes to its turn to be sown again, the yellow and white, 4lb. of each, are mixed with 3 half pecks of rye-grass per acre, so that the same field bears broad clover only every tenth year. Clover is mown for half a crown the acre, and one quart of ale per day. In the process of making, it is seldom shaken out of the swathes, only repeatedly turned till it is fit to carry to the rick; it is never cocked in the field. Clover is usually cut twice

* One tine, that is, the action of the harrows passing once in a place; going and returning in the same course is called a "*bout.*"

in the summer, the first time about the middle of June, the second in September. Produce of first cutting 1½ loads, say 1½ tons; of second crop 1 ton. Good clover sells for 20s. or 30. per load more than the best meadow hay, and is much used for cutting into chaff for coach and saddle horses. Sainfoin is sometimes cultivated on the chalky soils, and answers well for eight or ten years. Its hay is highly prized, but it is easily spoiled in making, one shower of rain ruining it completely.

Fallows intended for turnips are first ploughed in autumn, and repeatedly in spring, till perfectly free from weeds. The lands or ridges are then drawn out, into eight step lands, if the ground be dry, or into four step on wet or heavy soil. The dung, previously thrown up into heaps to ferment in the yards, is then carted on at the rate of from seven to ten dung-cart loads to the acre; immediately spread, ploughed in, and 3lb. seed per acre sown broadcast. Drilling is seldom practised, and for a curious reason, viz. that the hoers, and they are very clever ones, find more difficulty in thinning out a drilled crop than a broadcast one. The hoers are paid about 8s. per acre, that is 6s. for the first and 2s. for the second hoeing. One-third Swedish and two-thirds Norfolk white are the most approved kinds and proportions.

The farmer's establishment consists of a ploughman and boy, odd man, shepherd, and tasker. The two first have the care of the horses, and are constantly employed with them. They sleep in the house; rise at four in the morning, feed, clean, harness the horses, get breakfast, and be ready to go a-field at six o'clock. There they work till two, being a yoking of eight hours. The day's work is about an acre, more or less according to the state of the land or acclivity of its surface. It is calculated that to plough an acre well, the team must travel thirteen miles. The furrows are nine inches wide and five deep. When the horses return to the stable they are unharnessed, and have a little hay given them, while their attendants have dinner. This over, the horses are fed, curried, watered, and littered down. By this time it is half past four o'clock, after which the man or boy goes to the smithy with the share to be pointed, the other gets in litter or provender, green or dry, for the team. The allowance of oats to each horse is 1 bushel per week, with chaff and hay unlimited;

but when fed with tares or green clover, or when out at grass, neither oats nor hay is allowed. There is always an acre or two of the wheat stubble dunged and sown with winter tares and rye, for green food for the horses during May and June, after which they have part of the second crop of clover, or they are turned out in the meadows. At eight in the evening the horses, when they stand in, are racked up with hay, the men sup and go to bed. If the men board in the house, they have always plenty of bacon or some other kind of meat, with bread and small beer; hot, with vegetables at dinner, and cold for breakfast and supper. The masters live much in the same way, but with the appliances of tea twice a day, ale at dinner and supper, and occasionally some home-made wine.

A ploughman's wages are from L. 8 to L. 12 per annum, his boy from L. 3 to L. 5, with bed and board. If they board themselves, which, by their own choice is too often the case, the man is paid 7s. or 8s. per week, and the boy about 5s. Both are allowed small beer at their meals, whether on board-wages or not; but this they cannot demand, if they live out of the house. At hay-time and harvest they have the same allowance of ale as the other labourers. Most of the farmers brew their own beer, very great quantities being required both in hay-time and harvest. The men get three or four pints (English) of ale, and women two pints a-day, besides small beer at will. The farmer has also two regular festivals in the year, viz. sheep-shearing and harvest-home, at which he entertains a pretty numerous company. Sheep-shearing is done by a company of shearers who go from one farm house to another, till the whole in the parish is done. They charge 3s. 6d. per score for washing and shearing *, and are allowed their victuals and drink. For this purpose, a sheep is usually slaughtered, and a bountiful supper, of which all the other labourers on the farm and their wives are invited to partake, closes a very jovial day. The same sort of entertainment takes place at harvest-home, when the same kind of fare, and guests, children and all, assemble.

* The fleeces are wound up by the shepherd. About the month of August a well known woolstapler stops for a day at the principal inn, and invites the farmers to dine with him, and sell their wool to him. In this way they dispose of it at the market price.

The odd man, who is usually a married cottager at weekly wages, works the odd horses, goes to the plough and harrow, binds the hay, or assists in other business of the farm. He is qualified to "plough and sow, reap and mow, stack and thack;" he acts also as brewer and gardener.

Where the master himself does not do the duty of a shepherd, he must keep a man or stout boy in that character, though here "shepherd" is a misnomer, as there is no *herding* to do. This person's business is to see and count the flock the first thing he does every morning, get in the cows, suckle the calves, strip the cows, feed the pigs, fodder the things in the yard, and see that all the penns are clean and comfortable: all this he does again in the evening. In the middle of the day he assists in any labour in the fields, or mending gaps in the hedges, spreading dung, hoeing turnips; or, if wet weather, takes his flail in one of the barns. If this person be unmarried, he lives in the farm-house, but he is usually a married cottager, and receives the current wages of the parish, viz. 10s. or 12s. weekly; but during the harvest month he receives a round sum of L. 4 or L. 5 and his beer.

Another servant on the establishment, is the barn-man or thrasher. He is commouly called "*the tasker*," because, from an ancient custom, his daily task has been fixed at 4 bushels wheat, 6 of barley, and 8 of oats, besides binding the straw, throwing the grain out of the chaff, and measuring it up into sacks; all which when he has done, and got a flooring down ready for the next morning, he locks up his barn and goes home, even if as early as twelve o'clock in the day! But if he thrashes by the bushel, he is paid 7d. for wheat, 4d. for barley and peas, and 3d. for oats; but when he is so employed, much superintendence is required from the master.

The taskers are always at work by five o'clock, or as soon as they can see the sheaves on the floor. They are the greatest adepts at the use of the flail of any labourers perhaps in the world. Wheat only being bound in sheaves, it is astonishing to see with what neatness and dexterity they thrash out the grain, without breaking or deranging the position of the straw. This is a great advantage not only in facilitating the binding of it with two small bands in trusses of 40lb. each (36lb. to the load,) but also

by adding to its value for thatching, or for litter in saddle-horse stables. When two or three loads of wheat-straw per acre can be grown, and sold for 35s. or 40s. per load, it is a valuable addition to the crop. Wheat straw only is allowed to be sold off a farm in this parish, and in this case the landlord expects that an equivalent in dung or ashes shall be brought on.

Barley and oats being cut with the scythe and bow, (a tough pliable rod, one end fixed to and under the neck of the scythe, and the other bent up and fixed to the middle of the sned,) or scythe and cradle, and laid with great exactness in swathes across the lands, are, after being once or twice turned, raked into wads, and carried to the rick or barn, and trodden as firmly as possible. When these crops are thrashed, a quantity called a flooring is thrown off the mow, and shaken up in a high bank along one side of the floor, occupying two-thirds of its width. At the edge of this, on the vacant side, the thrasher begins his work, by striking off thin layers from the heap with the flail, and which receives repeated blows right and left, for with both hands the man is equally expert, and lastly he finishes the portion under the flail by whipping it to the right or vacant side of the floor, moving all the while forwards or backwards the whole length of the floor till the whole is finished. He rarely strikes directly downward, but always by oblique cuts to the right or left. He has also the art of tossing the wad he is engaged on up in the air by a forward jerk of the handstaff of the flail, and as quickly striking it horizontally with the swingle before it falls. These slashing blows do great execution, and when two men are thrashing together, it is astonishing to witness the rapidity of their strokes, and the perfect manner in which the work is done. One of their maxims is, that "corn cannot lie too hollow to be thrashed." The straw of oats, peas, and barley, is bound in bundles by the tasker, and carried to the straw-house for foddering the cattle.

It is customary to throw the corn out of the chaff every day, and put it up in sacks. For the purpose of winnowing corn there are *caving sieves*, for taking out broken straws and such like; wheat, barley, and oat *ridders*, for keeping back any thing that is larger than the grain itself. These sieves and ridders are made of hoops of ash or oak, about four inches deep, to the bot-

tom of which thin splents of ash or willow are interwoven at right angles, their ends being let into the hoop on the outside, or have their ends twisted together in a wreath, which is secured by a larger and narrower hoop pressed on at the bottom, and which keeps all in place. Two *wire-sieves* are necessary; one for sifting small seeds and sand from wheat, and the other for sifting cockle and burs out of barley. When the corn has been riddered, it is thrown in shovelfuls from one end of the barn-floor towards the other; every pile of chaff, and all other light matters fall behind; and all heavier substances, as peas or small stones, fly beyond. A light taper birch-besom separates the grades; the chaff is carried in a *fan* to the chaff-house,—the lightest of the tailings are carried to the poultry-bin; and the heavier matters, if any, are put through the proper ridder, and what is kept back is thrown into the yard to the poultry or pigs. If any seeds of weeds are discharged from the bulk in the process of cleaning, they are carried into the orchard for the finches.

Corn-fanners are hardly known in this part of the country; but there are two other appendages of a barn yet to be mentioned, which are made to answer the same purpose, and managed by one person, instead of two or three. The first is a corn or knee *fan*; this is shaped somewhat like a scallop-shell, without the hinge, and scarcely so prominent in front. It is nearly four feet in length, and two in breadth, and formed of wicker-work. The ends are turned up, and rise gradually from the front to the back, which is about ten inches high in the middle; the upper edges of the ends and back bend inwards. On each side of the centre, and about 14 inches therefrom, two semi-circular handles are fixed, by which the fan is held bearing on the knees when worked. The back is covered with sheep-skin, with the wool on to save the workman's clothes. The manner of working the fan cannot well be described, except only by stating, that half a bushel of the grain and chaff is taken into the fan, in which it is tossed up in the air by a peculiar action of the hands and knees, and in falling back, the chaff flies out in front. Oats are readily and sufficiently cleaned with the fan, without any other implement, and it is useful, besides, for many purposes in a barn.

Corn intended for market is measured up the day before. The barn-floor (which is always laid with oak-plank, beech or deal) is cleared, the corn being all brought to one end, and turned out of the sacks, whence it is, in the first place, all thrown towards the other end with the wooden shovel. This frees it from every thing which is either heavier or lighter than itself. When the light tailings, and heavier matters beyond, are swept up and disposed of, the corn is shovelled into a heap in the middle of the floor, to be skreened and measured up. The old-fashioned wire *corn-skreen* is on the same principle as those used for skreening lime or gravel. It has a hopper or open mouth at top, with a moveable horizontal slip to regulate the issue of the corn. The skreen is set more or less sloping, so as to allow the grain to trickle gently down into the fan (which supports the foot of it) whence it is shovelled out into the bushel, and thence into the sacks. The barn-man manages all this by himself, unless the master chooses to fill the skreen, and tie up the sacks for him, and which is generally the case.

Every farm here has, or ought to have, three barns; wheat and barley particularly require to be kept from intermixture. A few grains of oats, in ten quarters of barley, of ever so good quality, will lessen its value in the estimation of maltsters 5s. per quarter. From the number and size of the barns (they being mostly capable of admitting waggons to pass through) it appears that it was an original idea that all the corn should be under cover, and secured by lock and key. Whether this precaution was necessary against stray quadrupeds, before the farms were enclosed, or against unprincipled bipeds since, is not apparent *, but so it is, and it certainly saves much trouble and expence in stacking and thatching, especially in a country where all sorts of crops are quickly and thoroughly dried. Nevertheless, it is always a good sign of a favourable season, or good ma-

* In Flanders, Holland, Hanover, Mecklenburg, Prussia, Bohemia and Switzerland, the whole crop of grain is housed in barns. The different kinds of grain occupy different floors, through the whole of which is a large square opening or hatchway, and down which the sheaves, and all kinds of grain are bound into sheaves, are thrown to be thrashed on the floor below. These barns are of great bulk, and the roof is the most conspicuous part of them.—EDITOR.

nagement, to see ricks of barley and wheat standing along with the hay in the rick-yard.

The dwelling-house contains a parlour, with cellar under, entered from front-kitchen. A front-kitchen, with best bed-rooms over it; an attic for children or maid-servant, and back-kitchen for servants, with their bed-rooms over it. In the back-kitchen, the baking, brewing, washing, and scalding are carried on. On the north side of the house, a small dairy and pantry are attached. Quadrangular yards are formed by the barns, straw-house, cow-house, stable, with hay-loft over waggon and cart-lodge. This lodge-door opens outwards, not inwards, to the yard, lest cattle should get among the carriages, and hurt themselves. There is also a wood-house, a most material appendage to a farm-house here, as no coal is used by farmers except in the parlour on particular occasions. Wood-fires on the hearth are general. There are, besides, pig-styes and hen-house, with a small lock-up meal-house, fitted up with bins.

These buildings are variously arranged, as chance has fixed, or good judgment has been exercised. One leading principle is to have the yards open towards the south, and well sheltered from the north and east; the rick-yard behind the principal barns; the orchard behind the back-kitchen, and the little garden on the parlour-end of the house. The houses are chiefly brick, and tiled; the out-buildings framed with oak, weather-boarded with elm, and tiled. A chaff-house is always appended to the stable, raised a foot from the ground on brick-piers,—a hatch opening into it from the stable. The calf penns are at one end of the cow-house, and at the other, two or three stalls for fatting a dry cow, or a couple of Scotch oxen occasionally. There are also open sheds, with racks and mangers on some part of the yards.

The breed of horses are larger than they need be, and the farmers are very proud of a fine fat team; a piece of unnecessary and unprofitable agricultural luxury! The kine most suitable are the Ayrshire or small Short-horns, when they can be got; and Southdown sheep for the store flock. The quality of the meadows and pastures is not good enough for a large stock; and its liability to burn in the summer discourages prudent men from laying down additional grass land.

As to implements, a narrow-wheeled waggon, (first cost L. 40), for road-work is absolutely necessary for getting off hay or corn from hilly fields. It has head and tail ladders, and carries very large loads. Also two six-inch wheel dung-carts; these have fore and hind moveable ladders, and carry almost as much hay or corn as the waggon on the level ground. These tail-frames or ladders have a roller instead of a flat bar behind. This roller is pierced with two auger holes near each end, on one of which the binding-ropes are roved, and stopped by a knot at one end. The ropes are thrown over the load, pulled tight, and fastened before to the shafts. The load is further secured by the roller being turned in the manner of a windlass, by two short iron-levers, acting alternately in the vacant holes of the roller, and fastened to it by small chains. After the load is racked enough, one of the levers is left in the roller to prevent its return. Besides these dung-carts, there is a small cart for taking grists to the mill, turnips from the field, or any other light job. Cart-harness complete for four horses costs L. 20. Plough-harness is worth about L. 5.

The old wheel-ploughs of this country are large and heavy. They have no sole, but rest upon the ground-rise or riser, which is an inch-square piece of iron, attached to, and forming the base of the mould-board; and upon the land-side, on the tail of the share. The share-point is somewhat triangular, of wrought-iron, lined under the point, and on the land-side with steel. About a foot behind the point is the fore-tuck, leaning back, and almost close to the sheave. At the top it has a hole, in which a hook with a shank enters; the shank passes through the beam, and is keyed above. Immediately behind the fore-tuck a mortice is made in the body of the share, which fits on to the point of the sheave, and from whence the share-tail is continued back three feet in length, and secured in its place by the hind tuck, which descends from the heel of the beam. The plough is constructed in this manner, because of the hardness of the subsoil, and the large flints imbedded in it. A plough with considerable breadth of sole would be thrown out of the ground every instant; and even the present heavy one, if not teamed down too much, cannot be kept in deep enough; and lest they should enter in too much, wheels and a carriage

added to prevent them doing so. Here is an obvious waste of power; but as the ploughs are easily held, and cause very little labour to the holder, they are continued while lighter machines are condemned, notwithstanding many of the masters are convinced smaller ploughs would as well answer their purpose. A share-point, price 8d., seldom goes longer than one day; so there is a journey, either for the man or boy, every evening to the smith's shop.

Harrows are of the common make, viz. five beams, with iron tines; the four, when coupled together, cover a breadth of four yards. Except drag-harrows, very few other implements are used in farming; the soil is too stony either for the drill husbandry or for horse-hoeing. The ploughman, and even little boys, have excellent command of the horses, commanding them, in all movements, without reins, and chiefly by language, and showing the whip.

The other minor tools which are universally used, need no remark. New invented implements are not readily adopted by farmers of the old school.

Of parish society the clergyman is at the head. He is always highly respectable, and of great learning, the living being in the gift of one of the colleges of the University of Oxford. The incumbent is often a D. D. and constantly resident. Tithes, glebe, house, &c. amount to not much less than L. 700 or L. 800 a-year.

Next to the clergyman ranks the squire, a man of very large fortune, and who is also a magistrate. But feeling the business irksome, and confining him too much at home, he petitioned the Lord Lieutenant to have the clergyman put into the commission of the peace,—a manœuvre too often played off by indolent squires, thus bringing odium on the clergy, who, in many cases, would rather not be acting magistrates, as they never should be. The other grades of society are a few squires of lower degree, chiefly retired tradesmen from London; farmers, tradesmen, shopkeepers, publicans, and labourers.

The farmers are chiefly at the head of parochial government, ving the offices of church-wardens, overseers, road-surveyors, l tax-collectors in turn. The church-wardens have the care church and its purlieus, as to improvements and repairs,

and have to present flagrant breaches of morality to the bishop, or his representative. The overseers make and collect the rates for the relief of the poor, after they have been fixed by the magistrates. The books of these officers are examined by a meeting of the parishioners at Easter, in every year, and passed to the new officers, who are then appointed. On this occasion, all the heads of the parish dine together at an inn, and the day is spent convivially. There is a large poor-house, with thirty or forty inmates, who are fed and clothed by the parish. A master and matron preside over the affairs of the house, under the directions of the overseers. There are also out-pensioners and casual poor, altogether costing the parish not less than L. 800 per annum. The paupers in the house, who are able to do any thing, work for the parish, and sometimes earn nearly L. 100 yearly.

As the farmers are the native and principal class of society, the general character of the community takes its tone from them. For the most part they are uneducated men, and in this respect are but a small remove above their labourers. Some of them are, however, substantial; and all of them before the late derangement of farming affairs, were in what might be called comfortable circumstances. Their manners are homely, but they are hospitable and social. They know little of politics, and nothing of polemical divinity, hardly knowing the difference between a Roman catholic and a protestant! Having been baptised in the church, going there occasionally, reading a chapter in the Bible at home on Sunday, they live a simple life, their ambition being confined to the wish of being laid, when they die, with their forefathers, in the church-yard. A few of them are dissenters, chiefly on account, it may be observed, of their dislike to the payment of tithes, and because the clergyman reads his prayers and sermon!

The poor-laws have nearly ruined the moral character of the lower orders, by encouraging improvidence, and making them reckless of their fair fame; and even, in too many cases, these laws dissolve the sacred bonds of affection. Parents are thrust into the poor-house, because the overseer will not allow the children so much as they demand for maintaining their aged parents at home. In such cases, remonstrance and appeals to the proper

feelings of children are urged in vain; they plead their own poverty, and the overseer, one way or another, must comply. Dislike to yearly service, and to boarding in their master's house, is ruinous to the morals and personal conduct of the young men, who, being often out of employment, acquire irregular habits, and take to improper means to get their bread: they know the parish is bound to maintain them.

It is only within the last thirty or forty years that the children of the poor received any kind of education save what they were orally taught by their parents, or by the clergyman on Sunday afternoons, when he catechises the children in the church. Of course, very few of them could either read or write *. The rising generation, however, have all had some share of instruction in the parochial schools, which are now generally established. Whether the effects anticipated from these establishments will ever be realized, is at present doubtful. It has certainly enabled some of the children to obtain for themselves better situations in life; and, though extreme ignorance in school-learning is not now so prevalent as it was, there are yet no very visible signs of moral amendment. Education, like all other blessings, is valuable only so far as it is rightly used. If the resolution to make a proper use, could be enjoined along with the dissemination of it, all the expected good effects would undoubtedly follow from it, but not otherwise.

Tithes are paid by a composition in money, by a bargain made between the incumbent and the farmers; and, though it may be quite enough, *communibus annis*, it is sometimes, the farmers consider, not a fifteenth instead of a tenth of the produce. They are averse to the custom of paying tithe in kind, which is seldom heard of in this part of the kingdom, except to some improprietors.

There is no rule of regulating the wages of farm-labour in

* The English Church service is admirably adapted for an *uneducated* congregation. The poor, who cannot read, have opportunity to hear the whole of the Scriptures read over once in every year. They repeat the confession, and many of the supplicatory prayers and creed, after the clergyman and precentor; and to every petition they give an audible assent; so that an attentive hearer soon becomes acquainted with every thing he should believe, as well as all he should do, as a Christian.

this parish which may be mentioned, as springing out of the very ancient custom of paying servants in kind. It not only fixes the *minimum* of daily wages, but operates also upon the rates of payment for the execution of piece-work. Whatever may be the best price of wheat per load, of forty bushels, in pounds Sterling, a like number of pence is the price of a man's day's labour, and also that of a half-peck loaf of best wheaten bread. Thus, if wheat be at L. 20 the load, that is, 10s. per bushel, the price of the half-peck loaf, and the daily wages of the labourer, would be 1s. 8d., or 10s. per week. But as there are seven days in the week, the farmer usually allows another shilling. This gives the labourer a share of high prices, and satisfies him to be reduced, when prices are low. 'It also shews him how ridiculous it is for operatives to expect low priced bread and high wages at the same time.

Whatever may be the course of national events, or whatever changes in the relations of British society in general may take place, nothing will be likely to disturb the quiet of this obscure portion of the kingdom. There is not any thing between landlords and tenants, but what may be righted by the ordinary modes of settlement betwixt man and man. There are no signs of that excitable feeling which endangers the peace and social order of many other places in the kingdom at the present time; and, though there may be a few disorderlies in the village community, requiring the interference of the magistrate and constable occasionally to restrain, yet, on the whole, it is still a pretty true picture of old English manners and rural society.

M.

ON CONVERTING STRONG LOAM INTO PERMANENT PASTURE.

By Mr G. SINCLAIR, New Cross, Surrey.

(To the Editor of the Quarterly Journal of Agriculture.)

IN a former communication, which appeared in the last number of your Journal, I submitted to your readers an account of the successful conversion of an extensive field of strong tenacious clayey soil into improved permanent pasture, and I now beg

permission to present a similar account of a strong loam incumbent on clay; the site high, and exposed to the west winds.

The extent of ground is ten acres on the estate of John Evan Troutbeck, Esq. of Blencowe, near Penrith, in the county of Cumberland. The seeds were sown without any admixture of corn crop; they consisted of the following species of permanent pasture grasses and clovers, selected chiefly by Mr Troutbeck himself.

Cock's-foot grass . .	*Dactylus glomerata.*
Best improved perennial rye-grass	*Lolium perenne var.*
Hard Fescue . . .	*Festuca duriuscula.*
Meadow Fox-tail grass .	*Alopecurus pratensis.*
Tall oat-like soft grass . .	*Holcus avenaceus.*
Larger meadow Cat's-tail grass	*Phleum pratense var. major.*
Crested Dog's-tail grass .	*Cynosurus cristatus.*
Sweet-scented vernal . .	*Anthoxanthum odoratum.*
Common meadow grass .	*Poa trivialis.*
White clover . . .	*Trifolium repens.*
Perennial red clover . .	*Trifolium pratense perenne.*
Trefoil	*Medicago Lupulina.*
Broad clover . . .	*Trifolium pratense.*

These seeds were supplied at the rate of thirteen pecks to the acre. The details of the mode of sowing and after management I cannot do better than state in Mr Troutbeck's own words, because the facts and deductions brought forward agree so perfectly with the results of my own experience and observation, that I could add nothing to the clearness and force of the statement.

"To secure a good vegetation of the grass-seeds, much depends upon skilful management, for many have tried the plan and failed, and I have been condemned for making the attempt, the expense being so great; however, I am daily more convinced of the advantages arising from such culture. The secret lies here,—you must, in short, have your land in such order, that it will produce nothing but what you want it to grow. Notwithstanding the prejudice of husbandmen and neighbours, and the length of time and labour required to effect it, I worked land so completely that there was not a weed to be seen: I e it ten furrows, and harrowed and picked it until it was

thoroughly cleaned and well pulverized. After I have ridged the land up, which ought only to be done a few hours previous to sowing the seeds, I never allow a horse to set foot upon it: for when it is brought to such an exceedingly fine tilth, the foot-marks could never be got out even upon the driest soils. My ridges are six times about, and, before I sow, I harrow the land well, the horses going in the furrows. After the seeds are deposited, which ought to be done with a drill, for it is not possible to sow small seeds with the hand so well as a drill, I use a very light harrow with short teeth. There is scarcely a tillage-farm in this county which lies higher than the one I am now improving. The land I laid down last year with your seeds is a strong loamy soil, with a clayey subsoil. I dare hardly mention the quantity of stock the ten acres have upon them. I believe at this time I have upwards of forty wether-sheep, thirty-three lambs, and twenty yearling bullocks. I find you cannot stock too closely, and during the growing months of the year, sheep cannot keep down the coarser or hay grasses; and if you allow these grasses to get a-head, you ruin all. My grass, last autumn, kept as much stock as a common turnip-crop would have done, and made the sheep equally as fat.

"The beauty of this mode of culture is the great improvement of the land, for the more stock the ground carries, the more enrichment it receives, and this mode of enriching it is more beneficial than by eating turnips off; because the plants are there ready to receive benefit from the manure. Some strongly recommend rolling the seeds, but if the ground has been brought to a proper tilth, you do more harm with the horses' feet than good by the rolling. I purpose next year sowing other twelve acres more of very moderate land (for which you are now to forward me a sufficiency of grass-seeds), which I have fallowed well this summer, and which I might have sown with turnips, but I was afraid by so doing it would become too tenacious."

The following is an instance of a successful attempt to obtain improved permanent pasture on a light gravelly soil. On 13th April 1832, twenty-four acres of the Fleurs Lawn, belonging to His Grace the Duke of Roxburghe, were sown with the seeds of the following pasture-grasses and clovers: Cock's-foot, meadow fox-tail, Pacey's perennial rye-grass, tall oat-grass, mixed fes-

cues, sweet vernal grass, hard fescue, larger meadow cat's-tail, crested dog's-tail, common meadow grass, broad-leaved bent or fiorin *(Agrostis stolonifera)*, white clover, perennial red clover, and yellow clover. The quantity of them sown was 2¾ bushels per acre, without a corn crop.

On 28th June, eight scores of Leicester ewes with their lambs were put upon the new grass, and they all remained to the 4th August. On the 13th August, ten scores of ewes without their lambs were put on the same grass, and they remained as long as the 4th October, when the opportunity of my knowing farther about them ceased.—Such extraordinary results I suspect could never be obtained from what are called the artificial grasses, even though they were sown without a corn crop.

FLOUR-MAKING IN IRELAND.

It is curious to observe the different mechanical means which are adopted to produce similar effects in different parts of the same country. In one part a man and a pair of horses, with a plough, will turn over an acre of land in a day; while in another, the same extent of work requires a man, a boy, and two pairs of horses. In Scotland, wheat is ground into flour by one shealing, one grinding, and a boulting process; whereas in Ireland, two shealings, two grindings, and three boultings, are given to make flour from wheat.

It is a maxim in mechanics, that mechanical power is most judiciously applied only when it produces the greatest results it is capable of. Were this maxim practically applied to every operation in husbandry, a uniform system of mechanical labour would be instituted throughout the kingdom, and it would also have the effect of bringing into activity an immense capital, which at present is buried in unnecessary appliances. Take the cases of the ploughing the land and making flour, which have been alluded to. In the one case, were the Scotch mode of making flour to be adopted in Ireland, more than double the quantity of flour could be made in the same time by the same machinery of equal power; and in the other, were the Scotch method of ploughing introduced into every district in England,

nearly double the extent of land could be ploughed by the same strength of horse-power, in the same time. Now, if double the quantity of flour could be made in the same time, the Irish flour-miller would either derive as much more profit than he does at present, or he might have laid out only half the capital which he has employed in constructing his mill. In either way, the effect would be to give him a command of more capital to purchase wheat for the farther prosecution of his business. And if twice the extent of land could be turned over, then the farmer might part with half the ploughing strength kept on his farm; for in the usual course of the operation in his fields, it is not required to plough beyond the ordinary extent of one acre a-day per plough. He would thus require less capital to stock his farm at first, or, possessing that capital, he could expend it in any other way, such as the purchase of manure, which would improve its fertility, or he could afford to sell its produce at a lower price than he can at present. These are self-evident things; and yet they are very little attended to in the working of a great proportion of the land in this kingdom. Even in Scotland, where the economy of labour in general is well understood, the maxim is applied to the nearest approach to perfection in only a very limited district of the country.

The conclusions which we have drawn, have very much the aspect of propositions in political economy, a science not much in vogue among farmers; but there is a great difference between *theoretical* and *practical* political economy. These conclusions are considered true, not because they are so from a mere process of reasoning on the nature of things, but from experience, the parent of all true economy, whether it be political or domestic. We may be assured that, were the maxim in mechanics which we have stated, enforced in prosecuting the agricultural labours of the country, a capital, or, in other words, a sum of money, would be annually saved to the agricultural interest of Great Britain and Ireland, of which those who have paid no attention to the subject can have little conception. We shall, at some future time, submit a calculation to our readers on this subject, which will be worthy of their most serious consideration. We are aware of the difficulty of introducing any uniform system of labour throughout the country; but it shall not be our fault if

the importance of the subject at least is not impressed on agriculturists.

In the mean time, we shall see how the Irish flour-millers apply the maxim to the making of flour. The wheat, as it is received from the grower, is put through a shealing cylinder, an apparatus which is a cylinder of plate-iron punched with holes towards the interior, placed at an inclination with the horizon, and made to revolve on its axis. As the grain descends from this, it is winnowed through a common winnowing-machine. The shealing rubs off the prolonged ends of the grain, thrashes the grain out of its husk, and the winnowing blows away chaff and straws, and separates the grain from the seeds of weeds. The grain is again put through another shealing cylinder, of the same size and construction, but the punched holes are rather smaller, and more chaff, more seeds of weeds, and more earth or sand, are separated from it. This last process renders the grain fit to be ground. The wheat is then fed thickly in between two buhrstones, placed so far asunder as to cut it into a coarse kind of meal called "sharps," which is spread upon a floor for some time to cool. This meal, after being cold, is fed in very thinly, and ground by buhrstones set so close together, that a strong sulphureous effluvium is elicited from the friction of their surfaces against each other. The heat of the flour is so intense at the moment it leaves the stones, that the hand can hardly bear it. It is spread out on another floor to cool, where a man is kept continually turning it to cool it quickly. When quite cold, the flour is passed through a boulting engine, which revolves on its axis, and which permits the thirds flour and the whole bran together to pass through the coarsest-sized wire-gauze which is used for the purpose. The fine flour is then put through a similar engine, covered with the finest kind of wire-gauze, and divided into the fine and seconds flour. The fine flour is very fine, and the seconds is not coarse. The fine flour is sacked up from the spout of this engine, and consolidated in the sack by means of a lever and chains, which lift the sack up and beat the bottom of it against the floor. The sacks contain two cwt. of fine flour. The bran is divided into coarse and fine bran by a boulting engine adapted to this particular purpose. The bran is small and heavy, and evidently contains a white film of the kernel of the wheat on one side.

Any one acquainted with the making of flour in this country, will easily discover the unnecessary work performed in the process described above. One shealing is quite sufficient to clean wheat. It must be confessed, however, that in Ireland the grain is delivered in a very foul state to the millers. It contains chaff, often grains in the husk, sometimes even pieces of straw, always an abundance of the seeds of various kinds of weeds, which get leave to put forth all their strength and glory among the growing corn, and very frequently earth and sand. Any kind of grain in that foul state cannot be easily cleaned. We have seen a conical heap of chaff, upwards of two feet in height, blown from the winnowing machine in the course of three hours. Still, we think one shealing would suffice to clean the wheat sufficiently, if it were properly managed. The shealing cylinder, instead of revolving, ought to stand still, and the scutchers within it should go at a great speed. The grain should be passed from the hopper into the cylinder very slowly; it should also pass from it into the winnowing-machine slowly, and be spread out thinly and evenly, and the blast from the fans of the winnowing machine should be powerful. The winnowing-machine should always be furnished with a wire sieve, which will separate small heavy seeds of weeds and earth or sand.

The grinding process is ill managed. One grinding with buhrstones is quite sufficient to make fine flour. The stones should not be set closer together than to convert the grain into a meal which feels smooth when rubbed on the side of the forefinger by the thumb. In this way, the bran will be peeled off the whole grain into thin flakes; whereas the rough grinding of the grain at first, breaks the wheat into angular pieces, from which it is not possible to peel off the brown skin into large flakes, but which will be rolling about, with the bran adhering to the kernel. Bran made in this manner feels heavy, and falls from the hand on the floor heavily like meal. True bran feels light in the hand, and when thrown up into the air, falls to the ground uncertain of its course, like small pieces of paper. Heaviness in bran arises from a part of the kernel of the grain adhering to it, which ought to have been converted into flour. In a large establishment, we should conceive that the quantity of the kernel of the wheat which is thrown away with the bran,

would constitute a moderate profit on the wheat ground. In the first grinding, the stones are set too far asunder, and the wheat is fed through the eye of the upper stone or runner, as it is termed, too rapidly. The second grinding, on the other hand, has an opposite fault. The stones are set too near to each other, and the flour or meal is fed in too slowly. The stones are injured, and the flour is ground down too fine,—it is too much heated,—it is "killed," as it is technically expressed. Properly ground flour feels heavy, rich, and delightfully smooth and cool in the hand. "Killed" flour feels like hair-powder, and the heap appears puffed up and frothy. If the flour remained a length of time warm in the heap, it would be unfit for bread. To avoid this danger, a man is kept in the cooling room to turn it over continually, and to spread it out thin till it is quite cold. "Killed" flour will scarcely ferment with the best yeast, and it must be mixed with other flour of the same quality, or with potato-starch, before the dough will rise; but as other flour that has not been "killed" is difficult to be obtained in Ireland, recourse is had abundantly to the potatoes by the bakers.

The dressing or boulting of the flour is also attended with much unnecessary labour. One passage of the flour through a boulting engine, covered with the various sizes of wire-cloth adapted to the different kinds of flour and bran to be dressed, and the engine remaining stationary while the brushes within it are moved with rapidity, are all that are requisite to dress the flour thoroughly. In this manner the fine, the seconds, and the thirds flour, and the fine and coarse bran, are separated at once. What object there is in creating more labour in this particular department of making flour, it is not easy to comprehend. The fine flour is very fine in Ireland; but in the dressing, it has not a sufficient quantity in it of what passes among the seconds, which makes the latter finer than it ought to be, and of course a loss is thereby incurred. Fine, however, as the flour is, it is mixed with minute specks of bran, which is not to be wondered at, considering how the wheat is hashed down in the first grinding. We were at first astonished to find the finest wheat selling in Ireland at only from 10s. 6d. to 12s. per cwt., which is about 50s. per quarter, when the same quality of wheat was selling in Britain at the same time for 58s. and 60s. per quarter. But af-

ter seeing the filthy state of the stocks of wheat delivered at the flour-mills, and the quantity and weight of trash of all kinds which were taken out of it in the cleaning process, and the two-handed work which it had to undergo in the mill, our astonishment ceased; for unless the wheat were bought at a low price by the flour-millers, they could not afford to sell their flour in the English markets at the English prices. There is a considerable quantity of flour exported to England every year from Ireland, being for the year 1831, 113,194 sacks, as will be seen in a statement in our first miscellaneous notices in this Number. An Irish sack of flour is only 2 cwt., or 16 stones, whereas an English sack is 20 stones in weight.

There are numbers of great flour-mills in Ireland, particularly in the southern counties, where the greatest quantity of wheat is raised. In a very large one at Inver, near Larne, in the county of Antrim, the machinery is erected with the view of affording every conveniency to the work people. The grain, the flour and the bran, is carried to any part of the great buildings in buckets, travelling on pitch-chains. The moving power is water, and it is applied to an overshot wheel of thirty-six feet in diameter, and seven feet in width. This wheel drives six pairs of stones, two sets of shealing cylinders, and three sets of boulting engines, and an immense apparatus of buckets and sack-tackling. This mill supplies a great district of country with flour, as far as Coleraine on the one hand, and round by Belfast and Carrickfergus to Larne. Besides, there is a flour-mill at Ballymony, Belfast and Lisburne, respectively.

ON EXTENDING THE ANNUAL SHOWS OF THE HIGHLAND SOCIETY OF SCOTLAND.

(To the Editor of the Quarterly Journal of Agriculture.)

I OBSERVE that you have hitherto refrained from giving any account of the great annual shows of stock by the Highland Society of Scotland. Indeed, when we consider the ample details which are always given of the different kinds of stock which are exhibited at the shows, in the newspapers of the time, any farther account of them appears unnecessary. Though this cir-

cumstance should discourage me from addressing you on this subject, yet there are some observations of a peculiar nature connected with the last show at Kelso, which will plead my excuse for obtruding myself at all on your attention.

At the Kelso Show, the Highland Society threw the competition of stock open to the breeders of England. The breeders of England accepted the offer, and sent their stock to Kelso, and the result was, that a number of premiums went to England. This honourable rivalry must have been gratifying to the breeders of both countries; and as a proof that the Englishmen felt an interest in the show, some of them, I understand, have since become members of the Society, and many more it is probable will follow their example. Now that the Society has thus held out the right hand of good fellowship to the English breeders, it is, I think, an important consideration for the Society, whether these Englishmen should not be accommodated in future with an opportunity of participating in its exhibitions of stock more frequently than once in nine years,—the period which must elapse before another show can take place at Kelso; for, it is not to be supposed, that even were all future annual shows of the Society thrown open to them elsewhere, they could avail themselves of the opportunity, on account of the distance which their stock would have to travel in Scotland to the nearest place of exhibition; and travelling, we all know, is highly prejudicial to stock in high condition.

As matters are presently arranged, I have said, it is not likely that another Border show of the Society can take place in a shorter period than nine years. There has already been a show at each of the following towns, namely, Edinburgh, Glasgow, Perth, Inverness, Dumfries, and Kelso; and preparations are being arranged, I understand, for one at Stirling, Aberdeen, and Ayr. These points comprehend all the cultivated districts in Scotland. A cycle of nine years is required to pass over them. Nine years, it must be confessed, forms a very appropriate period for the return of a show of live stock, particularly that of cattle, for cattle being now generally ripe at three years of age, that period allows the improvement of three generations of them to be observed in a particular district,—a sufficient length of time to exhibit an improvement, or deterioration, if improvement

or deterioration there be. This period, then, appears to be a very proper one to fix as a minimum for the return of a show; but no harm can accrue from extending that period. I would therefore suggest, that two shows should take place on the Borders, once in five years, in order to encourage English breeders to compete with the Scotch, and to excite their interest, by affording them more frequent opportunities of showing their stock for large premiums. Were this kindly feeling farther extended to them, they would, no doubt, contribute largely towards the formation of handsome premiums. Now this opportunity could be offered in no better place, in my estimation, than the town of Berwick-upon-Tweed. The locality of Berwick is very favourably situate for a show of live-stock. It is quite connected with the Merse of Berwickshire, Lammermuir Hills, the seat of the black-faced sheep, and the eastern extremity of East Lothian. It is quite accessible to that fine district of country along the eastern coast by Holy Island and Bamburgh Castle. There is not a finer stock of Short-horns and Leicesters in existence than in this district. The neighbourhood of Alnwick has long been famous for excellent queys. The Cheviot Hills are not beyond the reach of Berwick; nor is the rich district of Kelso too far for stock to travel. Add to all these local advantages, the easy access to the town by means of steam vessels, which could convey stock and spectators from the south of England and the south of Scotland. Coldstream does not possess rooms large enough to accommodate the company that would be collected on such an occasion. The Town-hall of Berwick could dine five hundred persons; and, I have no doubt, that, were the proposal taken seriously up by the inhabitants of the town, and the farmers on both sides of the Tweed, the Corporation would render important assistance in making the show as attractive as possible to the whole country around.

The Highland Society of Scotland being strictly a Scotch Institution, it should not, in my opinion, hold any of its shows on the English side of the Tweed, even at the request of the English breeders, should they ever make such a request; and on this account Berwick might be objected to. But, though Berwick is governed by English laws, it is situate, as we all kn on the Scotch side of the Tweed, and, at all events, it clai

be a neutral territory. Nay, this circumstance might operate advantageously to the show; for, should any of the English breeders have the slightest prejudice to cross the Tweed with their stock,—and that many have still a prejudice to cross to this side of it, I know to be a fact,—they could have none to meet the Scotch on neutral ground. Such meetings may remove these unfounded prejudices against, and foster a more kindly feeling towards us, than has hitherto existed among the agriculturists of the sister kingdoms.

One great effect might result from these Border shows, which is, that when Englishmen see the eclat with which these exhibitions of the Society are always attended, they may call into existence a national English agricultural association, of a constitution and spirit similar to our Highland Society; and when I anticipate that, I anticipate in other words a lasting benefit to all the agriculturists of England who may be within the sphere of its operations. Whether, therefore, English breeders join the Highland Society, or institute a similar Society of their own, the great art of improvement will be promoted in either case. Z.

SUGAR-MAKING IN THE WEST INDIES.

Most people are acquainted with the state in which the vegetable productions of our tropical colonies are presented in the markets of this country; but few, we believe, understand the nature of the plant which supplies the particular kind, and far less of the preparation which it undergoes, to bring its produce to a marketable state. Every one knows raw sugar, rice, coffee, tea, and spiceries, and every one is quite competent to judge of the taste and flavour of these by mere inspection; but every one does not know how raw sugar is made, how rice, coffee, and tea are cultivated, whence arrowroot or sago is derived; or what is the nature of the plants, whether they are trees or shrubs which supply us with aromatic spices. To every one desirous of acquiring this species of knowledge, the agriculture of the tropics must be interesting, and particularly to agriculturists, by whom it will be seen, how very different are the natures of the productions of the earth which engage the attention of

the tropical agriculturists, from those which are the objects of their own solicitude. We shall supply that information.

As first in importance so first in order, we shall take the Sugar-cane. Much interesting information on the nature, properties, and mode of cultivating this useful plant, the products of which have now become indispensable to the comforts of civilized life, may be obtained in Mr Porter's book on the sugar-cane.

It appears certain that the Chinese possessed the sugar-cane at least two thousand years before its introduction into Europe. That curious people, whose knowledge of many of the useful arts has existed from the remotest antiquity, was acquainted with the manufacture of sugar from the sugar-cane, in a manner little inferior to the improved method of modern times. The Egyptians, who imparted the knowledge of many of the arts to Europeans; the Phœnicians, who navigated the whole of the globe known to them; and the Israelites, the peculiarly favoured people of Heaven, were unacquainted with the sugar-cane. The Greek physicians were the first who knew of sugar, and who spoke of it under the name of *Indian salt;* and by the characteristics given of it by Pliny, it must have been like our sugar-candy. It was used as medicine. The Arabian navigators to India brought this candy to Greece and Arabia, and learned that it came from the country beyond the Ganges, and was obtained from a species of reed. This reed grew at that remote period only in the Indian Archipelago, and in the kingdoms of Bengal and Siam; the inhabitants of which sold sugar along with spiceries to the natives on the Malabar coast, who gave it in traffic to the Arabians.

After the knowledge that this enticing substance was obtained from a reed, the inhabitants on this side the Ganges and in Persia examined the qualities of their own reeds, if haply they might discover the particular kind which yielded the sugar. A sweet juice was discovered in this manner in the Mambu cane, and when this reed had acquired the age of three or four years, its juice concreted into a substance resembling, in taste, at least, if not in appearance, the Indian sugar-candy. Not satisfied, however, with this discovery of the Mambu sugar, and still being left in uncertainty, how the extraordinary substance, the sugar-candy of India, was obtained from the reed, many

conjectures were formed by writers as to its mode of formation. Some, as mentioned by Strabo, thought it was a kind of honey which was made without bees, and which hardened into crystals; others, as Seneca, considered it as a dew which fell upon the plant; and others, as Pliny, imagined it was a concretionary gum which exuded from the reed.

All these theories were demolished by Marco Paulo, a Venetian nobleman, who visited the countries in which the sugar-cane grew, in 1250, and who there saw sugar, spiceries, and ginger, in abundance. After this the merchants of Arabia who went to Ormus to traffic with the Indians, brought both the sugar-cane and the silk-worm to Arabia Felix, whence both these extraordinary productions of nature passed into Nubia, Egypt, and Ethiopia, and thence became abundant. But though the Arabians imported the plant which yielded this delicious condiment, they neglected to learn the process by which it was obtained from it, and in consequcnce of this neglect the sugar of Nubia and Egypt, till the end of the fourteenth century, was black and coarse; they did not know how to crystallize it, by depriving it of its molasses. In Ethiopia the juice was sucked out of the reed. During that period the cane had found its way into Europe, into Sicily, where sugar was as indifferently made as in Arabia or Egypt.

A short time after the Portuguese had discovered Madeira, in 1420, they introduced the sugar-cane into it and the Canaries, where it grew very successfully, and the sugar which they made from it was preferred to that of any other country. That interprising people in navigation and discovery also introduced the sugar-cane into St Thomas's, an island near the equatorial line, immediately after its discovery. Its culture flourished so successfully, that in 1520 this colony had upwards of 60 manufactories. Negroes were there employed in its cultivation, which produced 4,650,000 lb. per annum.

Immediately after the discovery of the new world by Columbus, the Spaniards planted the sugar-cane in Hispaniola, since called St Domingo, and now Hayti. There the plant grew so luxuriantly that it was as thick as a man's wrist: mills were erected for crushing it, and apparatus for concentrating its juice, under the superintendence of experienced workmen from the

Canaries. Such was the rapidity with which this manufacture increased in St Domingo, that the magnificent palaces of Madrid and Toledo, as mentioned by Charlevoix, were built from the duties exacted on the sugar exported from it to Spain.

It does not appear probable that the sugar-cane is a native of America; on the contrary, it was never discovered there by any of the first Portuguese or Spanish settlers. The Portuguese introduced it into Brazil, for those shrewd colonizers soon saw that the climate of this newly established colony was admirably adapted to the development of the peculiar properties of the sugar-cane. From Brazil it was taken to Barbadoes, and thence it spread over all the West India Islands. Sugar was first made by the English in St Christopher's in 1643, and by the French in Guadaloupe in 1657; and when Jamaica was taken from the Spaniards by the English in 1656, there were only three small sugar plantations in the island. From 1466 to 1580, sugar was used in England only at the feasts of the great, and for medicine. After the latter period it was brought in abundance from Brazil to Portugal, and thence to England. We are thus indebted to the Portuguese for the first large supply of sugar, in 1580, though the Spaniards had imported it largely from Hispaniola in the early part of the sixteenth century.

According to Rumphius, the Chinese were acquainted with a chemical process for making sugar. They boiled the juice of the cane in large boilers over brisk fires, and they refined the syrup with the white of eggs and chicken fat. The principle of this process is quite in accordance with the chemical knowledge of the present day. They did not, however, possess the secret of refining sugar. Their mode of extracting it from the cane was very superior to that of the Arabians and Egyptians, long after the latter had obtained a knowledge of the plant. The discovery of the refining of sugar was reserved for the ingenuity of the Venetian artizans, who sold refined sugar in the loaf in the early part of the sixteenth century. It was first refined in England in 1544. The refined sugar of that day was, however, a very inferior article to that of the present time. Improvements in this art were then left to the trials and efforts of uneducated men; now, all the operations connected with it, are conducted on the strictest principles of science.

The sugar plant, in the sexual system of Linnæus, stands in the class *Triandria*, order *Digynia*; its Linnean cognomen being *Saccharum officinarum*. In the natural system of Jussieu, it is included in the family of *Gramineæ*, one of the most numerous and widely diffused tribes of plants in the creation; and one, in the cultivation of many of the members of which, the human race is highly interested, inasmuch as it supplies many of the delicacies and most of the food to the inhabitants of the globe. The sugar plant is a reed, but not hollow like some reeds; it has a spongy pith, which contains the peculiar juice which alone gives a value to the plant. The stem is jointed, and supports at its upper extremity a number of leaves, which shoot out alternately on both sides of it, and which give the head of the plant the appearance of a fan. The joints are eight or nine inches asunder, and every one supports a bud which encloses the germ of a new cane. The leaves are long and pointed, and they clasp the stem around, below a node, exactly in the manner of the leaves of oats or the other grasses. When allowed to blossom and carry seed, the bunch of flowers of the sugar-cane is somewhat like the flowers of the bog-reed. But as the juice of the plant is the valuable part of it, it is not desirable to allow it to blossom. The sugar-cane stands from six to twenty feet in height, according to the nature of the soil and situation. It comes to maturity from ten to sixteen months old, ripening the sooner the higher it is situated. It is hardy or tender according to situation. Difference in seasons has a visible effect in retarding or promoting its development. When the plant is ripe, the lower leaves drop off, and the stem assumes a yellow colour, with a bright surface. Its juice is modified according to its age; at first it is like the juice of unripe mucous fruits; then it is in taste and smell very like the juice of sweet apples; it loses these by degrees, and at length has a luscious sweet taste, with a very peculiar flavour.

There are many varieties of the sugar-cane. The Brazilian kind continued in cultivation in the West Indies till some time in the last century, when the French brought a variety from the Isle of Bourbon, which was said to have been imported into that island from the Malabar Coast. Another variety was introduced from Otaheite; and a third variety was imported from

Batavia, probably by the Dutch in Guiana. Sir John Laforey planted both the Bourbon and Otaheite kinds in Antigua, and soon discovered their superiority to the old ones. These two kinds are much alike; they have a pale-coloured juice, and are soon ripe; they stand a long continuance of dry weather, and they are little liable to the attacks of destructive insects. They have now banished the Brazilian plant from all our islands.

The soil which is acknowledged to be the best for the growth of the sugar-cane is a clay, with some sand in it, to keep it open. Abundance of this soil exists in St Domingo, and which sufficiently accounts for the extraordinary productiveness of that island in sugar, when it was industriously cultivated. A few spots only of this particular kind of soil is found in Jamaica. Black mould resting on a clay subsoil is the next best soil for the sugar-cane. If the clay subsoil is very retentive of moisture, it is necessary to drain it. This mould, when properly worked, is a very fertile soil for sugar. There is a black mould in Jamaica, which rests on marl. It must be, we suspect, a shallow vegetable mould, unless it is mixed with a considerable quantity of the clay, which is always associated with shell-marl. Considerable quantities of the best kind of black mould are found in Barbadoes, Antigua, and the Windward Islands. An ashy loam, probably of volcanic origin, is admirably adapted to produce sugar of the finest quality. St Christopher affords an excellent example of this loam. The deep alluvial soils of Guiana are very favourable to the great growth of the cane, but not so to the formation of a proportionable increase of saccharine matter. Canes do not flourish in sandy soils, unless they are nourished by irrigation in the dry season. Thus, we may observe, the sugar-cane is fond of a strong soil, not a carse-clay, but a clay of that quality which is best suited to the growth of Swedish turnips, or mangel-wurzel, in this country. This coincidence may perhaps warrant the inference, that clay soils are favourable above all others to the formation of saccharine matter; they are certainly favourable to the formation of gluten, a great component part of wheat, or albumen, which, as a vegetable substance, is the nearest approach to animal matter. The impermeability of clay may be useful to the cane in a tropical climate, in retaining water for a considerable time about its

roots. The hose-like form of that part of the leaf which embraces the stem is admirably adapted to retain water, by intercepting the descent of rain or dew down the striated stems. From the great quantity of sap in a sugar-cane, water, it is evident, must be essentially necessary to the healthy development of the plant. It does not thrive in a wet soil. Most plants exhibit a similar predilection. Even willows, though they are considered rather aquatic plants, do not thrive in wet soil, but rather in a dry one, so situate as to permit their roots to reach the water. Wet soils must be drained; and swampy ones be made dry by open channels, before a healthy vegetation can exist upon them.

Genial as is the climate of the Tropics to vegetation, the soil which supports the canes must be nourished with manure. The manure should be adapted to the nature of the soil; but the general principle of manuring the soil there, is the same as in this country,—rich putrescent manures and lime, applied at stated times, being the best means of preserving the fertility of the soil. The plans adopted by the West Indian agriculturist for obtaining a sufficient supply of putrescent manures are not the most judicious. Folding cattle within pens, and shifting the pens; tying cattle to stakes in the fields, and removing the stakes to another part, and sometimes strewing the leaves and tops of the canes among the cattle so confined, as litter, are the improvident means adopted in a hot climate to manure the soil. To adopt the system of folding in a hot climate, where evaporation proceeds daily with extraordinary rapidity, and, particularly, when it must be pursued in the dry season, which is the most favourable to the cleaning of the land, and most inimical to the growth of the cane, betrays a carelessness in the adaptation of a simple means to an end. The soiling of cattle ought to be conducted under cover, and then the soiled litter could undergo the requisite fermentation before it is desiccated by the heat. Fermenting putrescent manures is a necessary process even in a hot climate, for it is found that the crop of canes suffer, if green manure is applied to the soil. The soil when so treated can endure no drought. Lime, sea-sand, marl, and various kinds of composts, are very beneficially employed occasionally, as stimulants and correctives—as stimulants, to enliven

inert vegetable matter, and, as correctives, in neutralizing acidity, mellowing tenacity, and consolidating friability. Cane trash, which is the refuse of the canes, would, we conceive, make superexcellent manure; but it is generally consumed as fuel. This is extraordinary, particularly when we hear Mr Porter say, that "much compost is sent from this country to the colonies, recourse being had to supplies from England." Perhaps the labour attending the carriage of litter to cattle while soiling in sheds, and of applying the manure to the soil, may be considered too great. The labour is certainly great; but when the existence of a valuable crop is at stake, labour should not be grudged. A single man, with a horse and cart, or even an ox and cart, employed daily in gathering and carrying litter to the cattle, would accumulate an immense quantity of valuable manure in a short time. But what renders the system of folding even more inefficient, is, the cattle getting leave to roam about the pastures all day, when the manure must be rendered worthless to the land.

The West Indian agriculturists have a difficulty to encounter which should not be overlooked. In lowland plantations they have plenty of food for the cattle in the time of the sugar crop, —but after it passes away, the winter season of the cattle, as it may be called, commences, when there is no green food to give them, the heat having burnt up the forage. They are therefore allowed to wander about all day in search of food over burnt-up pastures, much to the loss of condition, and are only penned up during the night. The plantations in the mountainous districts afford herbage to their cattle at all times. Till a succedaneum is found for the refuse of the cane, the cattle must always fall, after crop, into low condition, when they are of course unable to work to advantage. Many European plants, such as lucerne and tares, have been suggested to be tried; but, in the mean time, the best plan probably would be to allot some ground in the lowland plantations for the cultivation of the Guinea grass, to be cut green, in successive portions; but the cultivated ground may be thought too valuable to be given up to the production of cultivated food for cattle.

As cattle can work advantageously only on green food, the horse, which can thrive upon hay, has been substituted for them

on many of the lowland plantations. They have been imported into the West Indies from England and the United States. The ease and expedition with which a pair of horses with a plough, harrows, and carts, when constantly employed, can turn over and clean a large extent of land, is a great saving in the hardest portion of their labour to the Negroes. Young, experienced, active ploughmen have been taken from this country to work the horses, and, by their example, many of the Negroes have learned to manage them with dexterity. A Negro ploughman receives some indulgences, to encourage him to work the horses with skill, and to be attentive to their comfort when not at work. Iron ploughs, made by Wilkie at Uddiston, near Hamilton, in Lanarkshire, have been imported, and used with great success. Scotch single-horse carts have also been sent out, which are employed to take manure to the fields, carry the crop of canes to the mill, and to transport the produce to the shipping-stores. Their naves must be made of fustic.

Food for horses is always abundant. During the crop, the cane-tops sliced down is an excellent fodder, containing much saccharine matter. After crop, one mowing of Guinea grass, covering three acres, will support five horses for three months at hard work, and it makes excellent hay. The cent. per cent. grass is a hardy plant, and easily procured in hay. Hay made of the leaves of the Guinea corn will keep good in stacks for years. The allowance of oats, which are imported from the United States, for a pair of horses, is half a bushel a-day, or about twenty-three quarters a-year; and even with this liberal allowance, a pair of horses can be kept for less than L. 30 Sterling a-year.

The period of horse-labour every lawful day is from sunrise to half-past nine o'clock in the morning, and from three in the afternoon to sunset, to avoid the intense heat of the day, and this completes an easy day's work of seven hours. Still, in that time, for 300 working days, a pair of horses could do a great deal of field-work, and much more than two pair of oxen could do in the same time. In the mountainous districts where fodder is plenty, cattle are always employed, and they are fastened together by yoke. They should be harnessed like the horse. It is an error to suppose that the greatest strength for draught lies

in the neck of cattle. They can draw by the neck, but when harnessed like horses, they can draw by the shoulder as well as horses, and work with as much freedom. In Ireland cattle are much worked, and they are in every respect treated as horses are.

Fallowing the land is beneficial to the cane-crop. It is bare-fallowed when the land can be thoroughly ploughed and cleaned, and this is the proper time for the application of lime, or it is green-fallowed with yams, eddoes, or other provision-crops. In either case the land is cleaned and manured.

The sugar-cane is planted in holes set in rows. At one time this part of the work was very laborious to the Negroes. They made the holes with a hoe, and they carried all the manure necessary for the crop on their heads in baskets. Now a better system prevails. The ground is ploughed, harrowed, and set in ridges: on these ridges deep furrows are opened up by the plough going and returning in the same furrow; the dung is filled into carts with a three-pronged dung-fork, the foot of the Negro using it being protected by a sandal,—for it must be borne in recollection that the Negroes in the West Indies require no shoes or stockings,—and it is spread in these furrows. All the heavy part of the work is thus performed without the Negroes. A man and a pair of horses can now hole the ground for the reception of the sugar-plant, in the time that forty Negroes required to do it.

The plant for setting is taken from the top of the cane, being the two last joints of the stem with a part of the top, which is deprived of its leaves. They are set at equal distances at two feet apart, in the bottom of the furrow, from eight to twelve inches below the level of the ground, and at three feet between the rows. In elevated situations they are planted thicker than where vegetation is more luxuriant. The dung and soil at the bottom of the furrows are intimately mixed together, and a thin covering of two inches of earth is brought over the set. As the plant grows, some of the earth which had been thrown up by the mould-board of the plough is brought down around the growing plant, and this process of earthing is continued till the whole earth that was thrown out is levelled with the surface, which is when the plant is four or five months old. In the mean time, the weeds must be killed by attentive hoeing between the rows.

Perhaps a horse-hoe, similar to that instrument in this country which scuffles the potato and turnip crops, would answer this purpose. If used, the rows would require to be set at least four feet apart.

The best season for planting canes is considered to be between August and November, as the autumnal rains invigorate the plants before the dry weather sets in in spring; but some prefer planting in May or June, when the rainy season commences, and then the plants are fit for cutting in February or March, when the dry weather becomes severe. It is bad practice to plant at all times of the year, which some do who keep a small strength on their grounds. They plant for convenience, not advantage.

There are two states of the cane which yield sugar; the one is in the state of the enlarged independent plant itself, the other is that of shoots which spring up from the stole of the plant after it is cut down. These shoots are called *rattoons*. When the plant itself is allowed to grow to maturity, it yields a greater quantity of sugar, perhaps one-third more than a rattoon; but its cultivation imposes additional labour in the cutting down and replanting. Rattoons yield a fine quality of sugar, and are not liable to be affected in stormy weather, but they degenerate every year; so that the best practice is to plant a certain proportion of the cane-ground, about one-third, every year, which will afford a fresh succession of vigorous rattoons. Planting even only one-third of the cane-ground imposes great labour on the Negroes, and to avoid this, many planters only supply the blanks with fresh plants, moulding up the old stoles with earth and manure, and loosening the soil around them with the spade or hoe. In the long run, profit may be ensured in this manner. But when horse-labour can be judiciously applied, it is certainly better to prosecute that plan, which will give a regular succession of vigorous plants. In very rich soil, the cane-plant may continue vigorous for twenty years, but in naturally poor soils, in elevated situations, or on soils that have been much worn out by severe cropping and little manured, two or three years is a long enough period for an old plant to exist. It has been recommended to make the rows east and west, that the trade-winds might blow along them, and throw the rain from the eastward among the plants. Sun and air are essential auxiliaries to the

plant in the elaboration of its saccharine juices; and that they may have free access to it, all its decayed leaves are taken off. This process is called *trashing* the cane. Severe drought is a great enemy to the sugar-cane, stinting its growth, and consequently its produce, to a degree to be seriously felt; but planting with judgment, and proper after-management, so that the fan-like leaves at the top may shade the ground before the dry season commences, will generally insure sufficient moisture in the ground to push the plant to perfection. The plant then requires no further care till it is ready to be cut down, except from adventitious circumstances, such as the attacks of insects.

One disease to which the cane is subject is called the *blast*. It is occasioned by a black or yellow variety of the *aphis*. When they appear, all the decayed leaves are carefully removed from the cane grounds and burnt, and the earth is loosened round each plant. If this does not succeed, the roots are watered with a wash of manure and sea-water, which effects a cure. It is said that this aphis never attacks those plantations in which the carnivorous ant, the *Formica carnivora* of Linnæus, or the raffles ant of Jamaica, is found. In Tobago, the juniper-fly causes similar destruction. Another destructive insect is the *borer*, which perforates every joint, when the pithy centre, becoming discoloured and sour, not only yields nothing at the mill, but communicates a dark colour and bad quality to the syrup of sound plants. As a cure, all the decaying leaves are stripped off the plant, for it is at the root of these that the fly deposits the eggs which give rise to the larvæ which penetrate the joint into the interior of the plant. A pinch of quicklime introduced into the heart of the cane, has been found a successful mode of killing this insect. Common ants are always numerous on the canes, but they are only annoying, not destructive; but the white ant has sometimes appeared, particularly in Martinique, and threatened total destruction to the crop. The way to destroy them is to mix arsenic with meal or flour, moistened with molasses. A lump of this dough is placed under a wooden bowl inverted on a board, in different parts of the plantation. They creep under the bowl in myriads, and devour the poison, and as the live ants always devour the bodies of the dead ones, great havoc is made among them by this contrivance.

Rats destroy the young plants under ground. Rat-catchers and terriers are therefore always in requisition. With all possible care many plants will go back. These must be beet up with young ones, and a small nursery of them in some rich spot will be found a useful appendage to the plantation.

A dry, smooth, and brittle skin indicates the maturation of the cane. To ascertain it more correctly than by the eye, an incision is made across the cane with a sharp knife: if the cut prove moist, the plant is not ripe, but if it cuts dry, and white particles appear, it is fit to cut. The canes are cut as close to the ground as possible; and one or two joints are cut off with the top. They are tied in bundles, to be carried to the mill in carts. In the mountainous districts they are carried on mules' backs, or slid down a wooden spout from the high ground; or even rolled down a precipice. In Guiana they are carried in punts, which are navigated along the trenches. They are carried to an enclosure near the mill. All rat-eaten or damaged canes are bundled up by themselves, and not sent to the mill at the same time, to vitiate the juice of the uninjured plants. Great care is taken to apportion the supply of cane exactly to the operation of the mill; for if more are cut than the mill can crush, the juice ferments in the cut cane; and if fewer cane be cut than the mill can crush, the mill and all other labour are stopped.

The canes are pressed between cylinders to express the juice from them. At first cylinders were formed of hard wood, lined with iron or steel, in a framing of wood, and three cylinders were placed in a line. This clumsy expedient gave way to cylinders made of cast-iron. They were, however, placed in the same line, the canes being passed between two of them, and returned between other two, the centre one being common to both. Now, however, most of the mills are made with hollow cast-iron rollers, each five feet in length, and two feet in diameter, and so placed horizontally, that all the three are nearly in contact with one another; one being uppermost, and to which the power is applied. The frame-work is also made of cast-metal, which is better suited to a hot climate than wood. The canes are fed regularly on an inclined board, like that of a thrashing-mill, between the two nearest cylinders, the under one being a little fluted, and from them they pass between the upper and farthest off under cylinder, the opening between them being only

one-eighth, or a quarter of an inch, to another inclined board, and fall in a heap below it. They are passed through a second time, when they are quite dry by pressure, and are then carried away to the trash-house. Water is the cheapest moving power, but that is not easily to be obtained in small islands: wind is a precarious one in a tropical region: cattle and steam are the most common. To keep a large stock of cattle for the express purpose of working the mill is expensive, and often inconvenient; and a steam-engine, though expensive at its first erection, incurs no expense in the slack time of the year. Low-pressure engines, however, require more water than there is to spare in some situations, and a certain dread exists against high-pressure ones. But now that the boilers of high-pressure engines are more safely constructed than they were, there is really more risk of accidents with the common boiler than with them. A mill moved by a ten horse-power engine will crush as much juice in twelve hours as would make three hogsheads of sugar; and ten steers in such a mill will produce 840 gallons of juice in an hour and a quarter. Too much precaution cannot be used to have all the machinery of a sugar-mill of the best materials, for an accident happening to it at that critical juncture would ruin the value of the whole year's crop. The canes are crushed immediately after they are cut, and they are cut when they are ripe, and the juice is expressed in quantities in a short time, sufficient to fill the boilers.

A trusty Negro superintends the operations of the mill. Every part of the machinery of the mill, and the apparatus connected with it, which comes in contact with the juice, is kept quite clean, and whenever the mill is stopped, those parts are strewed over with lime. The trash is spread out immediately till it is dried, and fit for fuel; for which purpose any fermentation in them would render them useless.

The juice of the sugar-cane, as it runs from the crushing-mill, is opaque, and of a dark dingy olive colour. It consists of water, mucilage, and saccharine matter, mixed with the stringy portions of the rind, and a powdery portion of the pith unavoidably separated from the cane in crushing. This juice is more or less rich in sugar, as the season is more or less dry, or the soil and culture have been more or less congenial to the nature of the plant. The juice passes very quickly into fermentation,

in twenty minutes after it is expressed, which renders promptitude in the boiling of it an essential requisite.

Now the busy and cheerful scene commences. The juice, as it runs from the mill, is received in a tank; and, whenever there is as much of it expressed as will fill the first coppers or clarifiers, which in large works are three in number, each containing 440 gallons of juice, it is made to flow along a channel lined with lead, into the clarifier. These boilers are made of cast-metal or copper, the latter best. The fire is then lighted under them. Quicklime, lime-water, or lime mixed with juice, in the proportion of 17 ounces to the 100 gallons, is thrown into the clarifier. The juice is never allowed to boil in this vessel, the temperature never exceeding 210° Fahrenheit. The feculent parts rise and form a scum on the surface of the liquid. Whenever the scum cracks and froths, the fire is damped, and the liquor is allowed to remain, if there is time, twenty or thirty minutes in the clarifier, during which much of the impurities of the liquor separate themselves from the juice. The clarified juice is then racked off by means of a syphon or a cock at the bottom of the vessel, and about a twentieth part of the whole liquid is left in it as refuse, which is carried away to be distilled into rum. The liquor passes from the clarifier to the largest evaporating-pan, having a light white wine colour, and being nearly transparent. If it has not this appearance, it can never make good sugar. In the evaporating-pan, the liquor is allowed to boil; and, as the scum rises, it is carefully skimmed off with ladles. Getting less by evaporation and scumming, the liquor is passed into a smaller evaporating-pan. The same process of boiling and scumming is continued in this vessel; and, if the liquor is not so clear as is wished, lime-water is added. The bubbles in this pan rise of a large size. The liquor is now in a state of syrup. The syrup is put into a smaller pan, where it undergoes the same process, with a greater heat, and then into the least and smallest pan, under which the fire burns to the greatest degree of heat. The same fire passes below all these evaporating-pans. This last pan is called the *striking teache*. The scumming process is continued to the last. It is customary to supply the loss by evaporation in the evaporating-pan, by taking the liquor from the ceding pan, excepting in the teache, where the liquor is al-

lowed to concentrate. When the ebullition in the teache is so violent as to raise the liquor up, the bubbles are broken by the ladle. Whenever the proper degree of concentration takes place, which is judged of by a peculiar adhesiveness of the syrup, the fire is damped or drawn, and the syrup is transferred as quick as possible to the coolers. This part of the process is performed with great care and expedition, as every moment the heat operates on the syrup, after it is properly concentrated, it destroys the quality of the sugar. The scummings are taken to the still-house. The *coolers* are made of wooden troughs one foot in depth, and of other dimensions as are required. Two separate emptyings of the teache are intimately mixed in the coolers, where, continuing for some time, the sugar crystallizes or granulates into the form in which we see the raw sugar in this country. It should remain in the coolers till it is quite crystallized, but it is too often hurried into the hogsheads. The sugar is carried from the coolers to be *cured*. The curing-house contains a large tank, sunk below the level of the floor, and made of masonry or wood-work, with an inclined bottom. Over it are laid strong joists of wood. This is the *molasses tank*. The hogsheads are placed on these joists, over the tank, having their bottoms pierced with holes, through each of which a crushed cane is passed till it reaches the top of the hogshead. The hogsheads are then filled with sugar; the molasses trickle down the canes into the tank, and its fluidity is promoted, if the curing-house is kept close and warm. In three or four weeks the sugar is ready to be shipped. On an average, 100 gallons of juice will produce 108 lb. sugar: this is the muscovada, brown, or raw sugar of commerce.

The Portuguese and Spaniards *clay* their sugars. This is done by putting the sugar from the coolers into conical earthen pots, which are placed in an inverted position, with a hole in the apex. The syrup which drops from them is received in pots, placed below them. A mixture of clay and water is poured on the base of the inverted cone, upon the sugar, the water of which descending upon the sugar, takes the impurities along with it. This magma of clay is renewed twice or thrice as it becomes dry. The pot is allowed to drop twenty days after the last application of clay is removed. The sugar is then taken out of the pots, and exposed for some hours to the sun. After

this it is kept for a fortnight in a stove to evaporate all the moisture out of it. When sufficiently dried, the loaves are taken out and pounded in wooden trays, and then packed in hogsheads as close as possible, for exportation. The clayed loaves from Havannah, after being taken out of the stoves, are broken into three portions, the base of the loaf forming white, the middle yellow, and the apex brown sugar. These portions are packed separately in wooden boxes, containing three or four cwt. each. The boxes of clayed sugar from Brazil weigh three quarters of a ton. About one-sixth part of the crystalline liquor is melted and carried off by the operation of claying.

The produce from the cane is as high as two and a half hogsheads of sugar per acre, and some of the larger estates will yield 400 hogsheads, of 16 cwt. each, from one crop. The quality of the sugar depends on the state of the season and the nature of the soil, but much more, we believe, depends on the skill in the manufacture. It is stated by Bryan Edwards, that "no less than L. 1500 Sterling on 200 hogsheads, has been known to yield a clear profit, beyond what the same number of hogsheads, where the commodity is of inferior quality, would have obtained at the same market."

Such is the process of making sugar from the juice of the sugar-cane. It is obvious that much improvement might yet be introduced into the process, by attending to chemical principles. The mass of impurities which raw sugar contains, clearly demonstrates that the process of making it is not conducted on scientific principles.

Among the recent improvements in the boiling of the juice of the cane, which have been recommended to public attention, we may allude to an apparatus contrived for that purpose by Dr Ure, and which he describes in No. 93 of the Repertory of Inventions. Dr Ure states that the waste of sugar caused at present by burning in the teaches, consequent imperfect curing and fermentation on the voyage, cannot be estimated at less than one-fourth of the whole.

In the description of the apparatus which he has invented for the better making of sugar, he proposes that the evaporating pans and clarifiers should have each a progressive rise in elevation, so that the liquor can be drawn off from the one to the other by s of a pipe and cock, and save the laborious work of lading

from one vessel to another, in a bath of steam. The evaporating pans are broad and shallow, so that the evaporation may proceed quickly; the syrup is concentrated quickly in the teache through the intervention of an unchangeable liquid contained in an iron vessel which, while it transmits the useful energy of the fuel, intercepts its scorching influence. The bottom of the teache is corrugated into rounded forms, which presents the advantage of creating double the evaporating effect, without raising the heat. The intermediate liquid is a solution of chloride of calcium, preserved at an invariable pitch of dilution, and consequently of boiling temperature, by means of a simple instrument called the *thermostat* or heat governor. Within three minutes of its admission into the corrugated copper, a mass of syrup equivalent to 8 cwt. of sugar boils with vigour, and it may be brought to its granulating consistence in a space of 20 or 40 minutes, according to the quality of the sugar, and the form and size of the pan. The sugar is then discharged into the cooler unscathed by the fire, however fierce and irregular it might have been. This apparatus consumes only one-half of the coals of the most improved naked pans of the London refiners. It would be capable of extracting sugar from the ripe sugar cane in crystalline grains nearly colourless, and of a purely saccharine taste,—a commodity as elegant and agreeable as much of our refined sugar. This sugar would command a high price in every market of the civilized world, which would serve to enhance the value of the West India estates from 30 to 40 per cent. The general adoption of this system will unquestionably tend more effectually to restore the fallen fortunes of the sugar planters, and to sustain them against foreign competition, than any fiscal enactment whatever; enabling them to achieve by capital, industry, and science, that independence which no scheme of government bounties can possibly bestow, and, in their resulting prosperity, to grant new immunities to the Negroes.

If any approximation to the improvements stated by Dr Ure were to be realized by the adoption of this apparatus, the West India planters cannot adopt it too soon. The quantity of sugar imported by them to Britain in 1828 amounted to 4,329,127 cwt. This improved process would increase this quantity one-fourth, or to 5,411,408 cwt., which at the low net proceeds of the year 1829, of 20s. 7d. per cwt., is equal to L. 5,569,240: 14: 8.

But if its quality was improved 50 per cent. by this process, that sum might be increased to more than double that amount. This would be a consummation devoutly to be wished by the planters. It is but justice to Messrs Beale and Porter to mention, that they obtained a patent in 1828, for the boiling of cane-juice, by communicating heat to it through an intermediate liquid, placed in a vessel below the teache. They meant to apply this principle to the whole range of the evaporating-pans and concentrating teache, but the particular liquid which they intended to apply is not mentioned. Dr Ure's method appears, therefore, to be the particular application of the chloride of calcium to Messrs Beale and Porter's apparatus, a little modified.

A successful attempt has been made in Demerara, to make sugar of true and well formed crystals, by a modification of the late Mr Howard's apparatus for boiling sugar *in vacuo*, with strainers of copper plates pierced with minute holes, or several folds of wire-gauze for clarifying the syrup. The process is, immediately on crushing the canes, to heat, lime, and scum the juice, which, while warm, is forced through the strainers, from which it runs into the boilers. These are provided with air-tight covers, the tops of which are connected by tubes, with a large air-pump wrought by a steam-engine. The scum as generated is thus drawn off, and the boiling is carried on at a temperature far below the boiling point of sugar. When sufficiently concentrated, the syrup is crystallized, and when consolidated, it is carried to the curing-house, the temperature of which is kept up by steam-pipes running into it. This process saves much sugar, for the heating being low, little or no molasses are formed, and a large quantity of sugar is obtained, which, in the old process, is converted into molasses. The sugar bears a premium in the Liverpool market, especially when required for coffee *.

With regard to the method followed in the West Indies in the distillation of rum, little need be said, for the distillation of spirits is a process in which little variety can be introduced. The most approved method has been introduced into the West Indies. In 1825 Mr Winter obtained a patent for an improv-
(apparatus for the distillation of rum. By the old method
) gallons required 118 hours 55 minutes, to run off 365

* Edinburgh New Philosophical Journal, No. xxvi.

gallons of rum at 42 per cent. over proof. Mr Winter's still ran off from the same quantity of wash, 410 gallons of rum at 52 per cent. over proof, in 105 hours. The spirit, too, was of finer flavour.

An estate which yields 200 hogsheads of sugar, employs two stills, one of 1000, and the other of 600 gallons. If running water is scarce, the worm is placed in a tank, capable of holding 20,000 to 30,000 gallons of water. Besides the stills, there are two cisterns, one of 3000 gallons, and the other smaller, to contain the scummings; and 10 or 12 fermenting vats; each as large as the largest still. Molasses, scummings of the clarifiers and evaporating pans, lees and the raw juice expressed on purpose from the injured canes, diluted with water, are used as wash for the distillation of rum. The proportions in which they are used differs in the islands, but the usual mixture is, 10 gallons of molasses, 20 gallons of lees, 30 gallons of scummings, and 40 of water; the saccharine matter in this mixture, is 15 per cent.; the fermentation is completed generally in five or seven days, and the crust being removed, the clear pungent liquor is poured into the still, before the least acetous fermentation commences. The quantity of rum produced from the mixture, will depend on the nature of the season, and whether the scummings have been reboiled and clarified, in which case the rum will be diminished in quantity. The average is perhaps from 80 to 90 gallons of rum to every hogshead of sugar made on the estate.

The uses and properties of sugar are so well known, that it is unnecessary to dwell upon them. With a few remarkable facts we will conclude. The experiments of Berzelius, prove that crystals of sugar contain very little water of crystallization; 105.6 parts containing only 5.6 parts of water, the rest being pure saccharine matter. Lavoisier was the first to discover that sugar is a vegetable oxide. Berzelius's analysis of it gives 49.856 of oxygen; 43.565 of carbon; and 6.879 of hydrogen in the 100 parts. The specific gravity of sugar according to Dr Thomson is 1.5629. Raw sugar kept in the warehouses of this country, assumes a degree of clamminess, for which reason, refiners always prefer new sugar. As an aliment Dr Rush of Philadelphia, maintains that sugar affords the greatest quantity of nourishment, in a given quantity of matter, of any subject in nature. Horses and cattle were fed wholly on it at St Domingo

for some months, when the exportation of sugar and importation of grain were prevented, from want of ships. During the crop-time in the West Indies, all appear fat and flourishing. The cattle fed on the cane tops become sleek and in a fine condition. The Negroes drink freely of the juice, and become fat and healthy. Sir George Staunton observes, that many of the slaves and idle persons in China, hide themselves among the canes, and live entirely on them for a time. In that kingdom the emperor compels his body-guard to eat a certain quantity of sugar every day, that they may become fat and look portly. Sugar and rice constitutes the common food of the people, and every kind of domestic animal is fed on sugar. Plagues, malignant fevers, and disorders in the breast, are unknown in the countries where sugar is abundantly eaten as food. The celebrated Franklin used to drink syrup every night before he went to bed, to alleviate the agonies of the stone. In short, Dutrone, with all the vivacity of a Frenchman, burst into a rhapsody on the excellences of sugar. "He not only panegyrises it as the triumpher over seasons and climates, in enabling us to assemble at our tables the fruits of every season and of every country; as the softener of asperities; the *delice* of confectionary; the seductive charm of liqueurs; but he would exalt it as the panacea of life, the invigorator of infancy, the restorer of sickness, the renovator of old age. He invites the brewer, the baker, the vintner, to prove its beneficial influence in their several arts. He calls upon the apothecary to acknowledge its aid in compounding medicines, and recommends the surgeon to lay aside his unctuous plasters, and to apply saccharine lenitives."

THEORY AND PRACTICE IN THE APPLICATION OF PUTRESCENT MANURES.

So long ago as 1812, the late Sir Humphrey Davy, when enforcing the propriety of applying farm-yard dung, in a recent state, said, "Many who doubted have been lately convinced; and perhaps there is no subject of investigation in which there is a union of theoretical and practical evidence *." Since that

* Agricultural Chemistry. Lecture VI.

period to this, we suspect few farmers at least have become converts to Sir Humphrey's doctrine; for we should say, in judging from the practice of farmers, that there is no subject in husbandry in which theory and practice differ so widely as in the management and application of putrescent manures.

Theory recommends dry straw to be applied as manure, and kept dry in a house till it can be used, because it would decompose more slowly in the soil than when fermented previous to its application; and, though it would produce less effect at first, its influence would be much more lasting. In practice, straw is never applied in a dry state; it is always wetted, and mixed with animal dung, because it is found that the vegetation of the plant, which is intended to be accelerated by the manure, would be too long retarded for it to exhibit a full development of all its parts in due season, were it to remain stationary till the dry straw rotted in the soil.

Theory says that farm-yard manure cannot be applied in too recent a state to the land, because the least decomposition dissipates its gaseous products, which are the most valuable parts of the manure, as food of plants. Practice prevents, in most cases, the application of recent farm-yard manure, because it finds that recent manure applied to any spring crop, keeps the land in too open a state in dry weather; and, though gaseous matter should be driven off by decomposition, it also finds that fermented dung is a more powerful manure, in every case, than rank dung. In particular cases, when it is desired to manure the land without a crop, such as a stubble-field which is intended to crop the following spring with potatoes, or on rich carse clay-land, the dung may be applied in a recent state; for, in the first case, the manure will be rotted in the soil before the planting of the crop; and, in the second case, the richness of that kind of clay-land can support a vigorous vegetation in the plant, until the manure is decomposed in the soil.

In theory, dunghils would be kept dry and cool till they were applied to the land; because, if dung cannot be immediately applied to crops, the destructive fermentation should be prevented very carefully; and if dung has been fermented to a mere soft cohesive mass, it has generally lost from one-third to one-half of its most useful constituent elements. In practice, on

the other hand, dunghils are quite exposed to the weather, because all dry litter which has been even decomposed a little, such as that under sheds, in which the cattle are accustomed to lie all night, or an unmixed mass of horse-dung, is found to be of themselves a worthless application to any crop. These are mixed by turning them over among the wetter cattle-dung, that the whole mass may be fermented to an equable consistency. Practice has also discovered, that the crop of turnip will be risked altogether, if well fermented dung be not employed. Indeed many farmers maintain that it cannot be too much fermented for the turnip crop. Two years fermented dung is kept on purpose, by many who have abundance of straw to apply to the raising of Swedish turnips; and certainly the shorter the dung is the quicker is the braird, and the more healthy and heavy is the turnip likely to be. Fermented dung is the more applied every year, even to the potato crop, which was for a long time supposed to be best immersed among rank dung. In true potato soils, the crop is decidedly better to be raised with fermented dung. Fermentation is also found useful in killing the vegetative power of the seeds of weeds or grains of corn that may have passed away among the straw. Thus we see from the "evidence" which we have adduced, that there is not only no "union," but a decided opposition between the theoretical and practical methods of treating and applying putrescent manures.

There are, moreover, some objections of a physical nature to the application of recent farm-yard manure. It is found to be scarcely possible to plough down a large quantity of dry straw or very rank manure in any soil, because the plough furrow is not of sufficient capacity to contain as much dry strawy manure as would be required for the nourishing of the soil; and dry strawy manure is difficult to bury, because it slips along the ground before the furrow which the breast of the plough is turning over. These difficulties are the greatest on light soils. When dry manure is applied to any crop which has to be sown and harrowed in, in a short time after its application, the harrows will bring up considerable quantities of it to the surface. These objections Sir Humphrey admits, where he says, "there can be no doubt that the straw of different crops immediately ploughed into the ground, affords nourishment to plants; but

there is an objection to this method of using straw, from the difficulty of burying long straw, and from its rendering the husbandry foul." Besides the foul husbandry, there is still another objection to the use of dry manure of a bulky nature, namely, the rendering the land on which it is laid, particularly all light and loamy lands, of which the most of the soil of this country consists, too open, and thus making it liable to be burnt up in dry weather. Hence dry manure must be quite inapplicable in the summer season.

But let us look into the theory of this subject, and see if the rules for practice drawn from theory are correct ones.

All animal and vegetable substances form food for plants; but in what particular state their food is in when they receive it, is not yet precisely ascertained. It appears probable that the food received through the agency of leaves is received in the gaseous state; but it is not certain whether the roots take up their food in a solid state, and then convert it by elaboration into a gaseous one; or whether the roots have the power of converting solid food into a gaseous state by mere contact; or whether they can comminute solid food into its integral molecules, which are beyond the reach of our physical senses, however they may be aided by the most powerful instruments, but which they first absorb and then convert into a gaseous state,—these constitute some of the arcana of Nature, which will probably for ever elude our acutest observation. Some experiments which Sir Humphrey Davy had instituted on this subject led him to remark, "that these results, though not quite decisive, favour the opinion that soluble matters pass unaltered into the roots of plants; and the idea is confirmed by the circumstance that the radical fibres of plants made to grow in infusions of madder are tinged red; and it may be considered as almost proved by the fact that substances which are even poisonous to vegetables are absorbed by them." Having proved that soluble matters pass unaltered into the roots of plants, Sir Humphrey then makes this assertion, that "the great object in the application of manure should be to make it afford as much soluble matter as possible to the roots of the plants, and that in a slow and gradual manner, so that it may be entirely consumed in forming the sap or organized parts of the plant." He farther states, what is ab

dantly true, that " woody fibre is always in great excess in the refuse of a farm ;" and, in order that the fibrous and insoluble matter may become the food of plants," it must undergo chemical changes." These chemical changes are produced by putrefaction in the animal, and fermentation in vegetable substances, and " similar circumstances give rise to both."

These are simple propositions, plain statements, which can be easily illustrated by ample experiments. Apply them to the materials which form farm-yard manure, and the conclusions to be deduced from them obviously appear to be these ;—that the greatest bulk of the farm-yard manure is composed of a fibrous and insoluble substance, derived from the straw ; that much of the dung of cattle must partake of the nature of straw, since they live upon it in winter, when the greatest bulk of the farm-yard manure is made ; that both the dung and the straw must be made soluble before they can become the food of plants ; that there is no mode of making these substances soluble, but by fermentation ; that there are two modes of producing fermentation to render the fibrous matter soluble, the one under the soil, and the other above it.

Theory would at once determine, that it should be carried on under the soil, because if it were produced above the earth, " there would be a great loss of nutritive matter." The component parts of the substance of vegetables and dung can be converted into the food of plants ; but it does not follow, that while they are disengaging themselves from the adventitious mixture of water, when they are becoming the food of plants, that they are necessarily losing any of their nutritive properties, we have seen that insoluble matter can be made soluble only through the instrumentality of fermentation. But, says Sir Humphrey, " no fermentation can go on without the generation of elastic fluid ;" and yet a few pages farther on, he says, " if a thermometer plunged into the dung does not rise to above 100° of Fahrenheit, there is little danger of much aeriform matter flying off." If we look at the state of the straw in a farm-yard, we shall observe that the moment that it is thrown out and trampled upon by cattle, it is wetted by rain or urine, or mixed with dung, and that the process of decomposition commences in the straw and the dung, in the common air,

though the temperature of the mass should be far below 100°. Indeed not a moment afterwards passes without a disengagement of aeriform matter from the dunghil, as may be visibly exemplified in a frosty day, or any night in winter. Sir Humphrey himself acknowledges, that "moisture is the principal agent in all processes of decomposition; dry fibrous matter will never ferment. Water is as necessary as air to the process; and to supply it to fermenting dung, is to supply an agent which will hasten its decay." He farther remarks, by stating a well-known fact, that "it is usual to carry straw that can be employed for no other purpose to the dunghil, to ferment and decompose," but in case it should ferment before it is wanted for the land, he recommends it to be "kept dry till it is ploughed in for the use of the crop."

The question is now brought to this, whether the crop is most benefited by recent or well-fermented manure? Observation alone can decide this question.

All agricultural crops are raised from seed. That seed, whenever it is deposited in the bosom of the earth, begins to undergo a change,—a change as mysterious in its operation as the consumption of food by plants. The object of applying all kinds of manure is to nourish the seed which is sown in the earth: and we know from observation, that its development is much accelerated by the immediate assistance of the manure. If manure requires to be in a soluble state before plants derive benefit from it, it is evident the greater state of solution in which the manure is, the more easily will the plant be enabled to derive benefit from it. This point is finely illustrated by the quicker efficacy of liquid than solid manure, in nourishing the plant, when both are applied of equal strength. Now, if there is no way of making manure soluble but by fermentation, it is also evident a great degree of fermentation will dissolve all the fibrous portions of putrescent manures the more easily. This point is also well illustrated by a fermented dunghil, the materials of which, if properly commixed, will ferment strongly for a time, and then the fermentation will subside to a low degree, leaving the whole mass in that pulpy sappy state, than which nothing can give a better idea of a soluble state of a fibrous body. Whether any really nutritive matter is driven off

by fermentation, before the mass is brought to that pulpy state, may be doubted; for the evaporation from such a dunghil appears to be just the steam of water in a highly elastic state, glimmering like a hot haze in a sunny day in summer, on looking across a ploughed field. But even should some gaseous matter escape during fermentation, this undeniable fact remains untouched, that this fermented, pulpy, sappy mass of manure, will go much farther in maintaining the fertility of land than the same bulk or weight of recent farm-yard manure.

Now, suppose the land were manured with recent putrescence, the plough could not possibly cover in so much of rank dung as to fertilize the land to the same degree as concentrated manure. The recent manure cannot ferment or become serviceable so quickly in the soil, as in a dunghil. The seed, therefore, cannot receive immediate benefit from the recent manure, and while it must grow in a puny state till the manure be prepared for it in the soil, many contingencies might occur through the nature of the season and the attack of insects, which might destroy the whole crop,—a destruction which could easily be effected in that early stage of the crop, unsupported as it would be by manure. In regard to the heat which recent manure gives out to the soil, while it is undergoing the process of fermentation in it, observation proves that it is not of so beneficial a kind as that derived from fermented manure, for the latter, too, emits heat, and re-ferments after it is placed into the soil. Nay, the heat or fume arising from the fermentation of recent manure in the soil, always injures the turnip crop. In every view, therefore, which observation permits us to take of the comparative effects of recent and fermented manure upon crops, we must come to the conclusion that the latter grants much greater benefit to crops than the former. Indeed, Sir Humphrey again admits, that a "slight incipient fermentation is undoubtedly of use in the dunghil; for by means of it a disposition is brought on in the woody fibre to decay and dissolve, when it is carried to the land or ploughed into the soil."

But in case Sir Humphrey should admit too much, he immediately adds,—"Too great a degree of fermentation is, however, very prejudicial to the composite matter of dunghils; it is [illegible]er that there should be no fermentation at all before the

manure is used, than that it should be carried too far." If fermentation is allowed to be at all necessary to render the fibrous refuse on a farm available to plants, the *degree* to which it may be carried, must be decided by observation, which can alone determine the effects of manure upon plants. There is very little danger in allowing fermentation to take its course in a dunghil, *if the materials of which it is composed be properly commixed.* If horse-dung alone is fermented, it will proceed to that excess which certainly "tends," as Sir Humphrey says, "to the destruction and dissipation of the most useful part of the manure; and the ultimate results of the process are like those of combustion;" but if it is mixed up with cattle-dung, and the drier portions of manure, which are made under the sheds, are mixed intimately with the wetter contents of the open farm-yard, the whole mixture will certainly not ferment beyond the point which is most suited to render it in the best possible state for applying, as immediately available manure, to the minutest seeds used in agriculture. In a large dunghil of such a mixture, the heat of active fermentation subsides in it long before any of its useful parts are destroyed, and long before even all the water which it contains is evaporated out of it, for, on examination, the manure will be found to be quite *short*, and easily lifted with fork or shovel, and at the same time it will be saturated with the richest black coloured juices, which appear to be the essential parts of urine deprived of their water.

It must be confessed, however, that great negligence exists in practice in the mixing together, and the mixing up, of dunghils, with all the best proportion of component materials. It may be, that the contemplation of bad practice has been the cause of Sir Humphrey advocating so strongly a recommendation of a practice which, while it is inimical to the welfare of the crop, is certainly founded in common sense to a much greater degree than the usual management of putrescent manures by the small tenants of the country.

Our principal object in entering on this subject at present, has been to confute Sir Humphrey Davy's assertion, that the practice and theory of the application of putrescent manures are in unison. We have shewn that they are diametrically opposed to each other. The great authority of Sir Humphrey's opinion

has certainly had the effect of satisfying the minds of experimentalists on this important subject, for we observe that every chemical writer since the publication of Sir Humphrey's Agricultural Chemistry, has just borrowed his ideas on manures. We hope that chemical agriculturists, as well as agricultural chemists, will devote their attention to this subject, and produce a theory which will be more in accordance with observation, or introduce such an alteration in the present practice of applying putrescent manure, as shall be founded on a more philosophical basis than the present practice.

ON THE WORKING OF BELL'S REAPING-MACHINE.

THE reaping machine invented by the Reverend Patrick Bell, having now been seriously tried for some years, we have collected such facts regarding its efficiency and utility, as may be interesting to our readers. These facts have been communicated to us from those who have used the machine for some years, and whose opinions of it, freely expressed, are therefore entitled to attention. We are sure no one will be more desirous to hear the opinions of practical men upon the working merits of his machine, than our friend the inventor himself; for it is his great desire to see the machine brought to the highest degree of perfection to which it is capable of attaining; and we know further, that he has not only superintended the construction of most of them under the mechanic's hand, but he has cheerfully travelled to a distance, to give directions for its use to beginners.

It is quite unnecessary to give here any detailed account of the structure of this machine. That has been amply done by the inventor himself, in 1829, in the second edition of Loudon's Encyclopædia of Agriculture; and a figure of the machine, with a short account of it, will be found in the first volume of this Journal. Since then no material alteration has been made in its structure. Attempts have no doubt been made at modifications in different parts of it, by country mechanics, who are perhaps desirous of establishing a local fame; but no modification of the original has yet turned out an improvement. Indeed we conceive, that so long as the cutting, gathering, and laying

processes are conducted on the principle developed in this machine, no improvement is likely to be discovered in them.

In subjecting the first-made machines to the wear and tear of active operation, it was found that they were too weakly put together, some part giving way at the moment when the work was going on admirably, to the provocation of the owner. Every part of it ought to be substantially put together. Experience alone can adjust the relative strength of the parts. The jolting over furrows, stones, and cuts, when the machine is going at a rapid pace, must endanger the materials, unless they are made strong enough to withstand these shocks. The strength of materials necessary in a complicated machine, when standing fixed in its working position, may be calculated to a nicety; but theory will be put to its shifts if the same complicated machine is made to operate over the unequal surface of the ground. It is this consideration, more than any other, which should induce inventors of reaping-machines, or indeed any machine which is to be used in the field, to construct them as simply as the nature of the work required of them can possibly admit. The strength of materials will no doubt increase the weight of the machine, but mere weight will be found no obstruction to the easy-working of the machine. A strongly constructed reaping machine will weigh from eight to ten cwt., and cost from L. 30 to L. 35. A pair of horses, on a level field, working in the reaping-machine, will not be more fatigued than they would be, after working an equal time in the plough. The greatest angle which the machine can surmount to advantage, under constant work, is a rise of one foot seven inches in ten; but a small knoll in the middle of a field, can be passed over at one in five. The furrows of ridges, or cross-cut-furrows, are no great impediments to it.

It seems to be a great desire, when the machine is at first used by a purchaser, to employ two persons to work it, one to hold the *helm*, which guides it in its course, the other to drive the horses. This is found in every case an improper arrangement. One man holding by a rein to each of the horses' heads, in one hand, and the helm in the other, is quite capable to command both the machine and horses. An unexperienced hand may deviate in his course a little, in cutting, but experience, with two steady horses, will soon teach him to hold as straight a

line with a machine as a furrow with a plough. The workman soon gets reconciled to this species of work. To cut inferior corn in deep furrows, neatly, the machine should have the furrow at that side of it from which the cut corn is laid down. The wheel should not be in the bottom of the furrow, but should go on the edge of it. The machine cuts easiest along the ridges. Beginners will find it convenient to cut down at first about ten yards of the corn across the ends of the ridges, to have room to turn the machine with ease; but practised hands can clear the turnings on the head ridges with the machine itself. In cutting corn, the collector should be placed as high as to strike the corn about six inches below the ear; and the longer the straw of the corn is, the farther forward, and the shorter the farther back, should the collector be placed. In cutting very short corn, the collector can be placed within an inch of the cutters, and brought back almost to the canvass. A precaution is necessary in cutting down the corn. If the small wheels of the machine are not covered in with wood, a thin deal should be fixed to the horns of the machine with its end continued so far as that the roller shall prevent the corn, when cut, from running up the canvass, and being caught by the teeth of the small wheels. When the corn is standing, it can be cut down in both directions with equal ease; when it is laid, the machine must go against its face, and return empty. Two-thirds of regularly laid corn can be cut in the time of a standing crop. One-half, it might be thought, could only be cut, as the machine has to return empty; but it is found that the empty machine can return quicker than when cutting, and the horses being eased of their draught when returning, can walk the faster when cutting down. But when the corn is laid in all directions, it is necessary to raise that which lies away from the machine with a stick or pitch-fork.

The cutters are the only part of the machine which is apt to get out of repair. The shears should be moderately tempered, neither too hard nor too soft. They will most probably work a day or two without trouble; but after that the cut-corn may not come off the canvass so regularly as it should, and the work becomes worse done the longer the machine is kept going. In such a case, it may be supposed that the canvass is not working

properly, and attempts will probably be made to remedy it; but it is in fact not in fault. It will be the last to fail. When this interruption to good work is observed, the machine should be put back, and the shears examined, and it will be found, that though only one-half of a shear-blade is beyond the level of the rest, that is quite sufficient to spoil the whole work. Tightening the screw-nut with a screw-key will remedy the evil. But after the machine has worked a season or two, the mere tightening of the bolts is not sufficient. In consequence of the wearing of the operating part of the shears, they will become too high in the back end, and to obviate this derangement, the shears must either be bent down a little, or a slip of iron, about an eighth of an inch thick, be put between the back end of the cutter and the moveable bar. With the exception of accidents, the machine will cut down fifty acres of corn before the cutters require to be sharpened. If contact against a stone should break out a piece in the side of a cutter, that part must be ground down on a grinding-stone; but to prevent delays by such accidents, a spare cutter or two should be provided, to be employed on such an emergency.

Since the completion of the invention in 1827–28, the following number of Scotch acres have been cut by this kind of reaping-machine,

Of Crop 1828, by	1 machine,	7 acres,	
..... 1829, ...	2 machines,	30	
.. .. 1830, ...	5	87	
..... 1831, ...	7	219	
..... 1832, ...	10	320	

If the number of acres which were cut down by all the machines, were averaged by the number of machines employed, the work performed by each would appear small; but, in fact, the respective number of acres cut by the ten machines in operation in last crop, are 70, 55, 50, 40, 40, 25, 18, 8, 8, and 6 acres. It is difficult to ascribe specific reasons for this great difference in their respective operations. The nature of the ground, the crops, and the dexterity of the workmen employed, will no doubt account for some difference in the result. In the three last cases there was no more corn to cut by the machine. Be-

sides these machines, ten more have been constructed, two of which were sent to Van Diemen's Land, and two to Poland.

There is considerable difficulty in ascertaining precisely the number of acres this reaping-machine could cut down in a day; so much depending upon adapting the means to the end in the management of it. With very long ridges and good standing corn, 10 acres may be cut; with long ridges, and the corn lying in one direction, 7 acres; with short ridges, 6 acres are as much as could be cut down. The greatest feat which the machine ever performed was in cutting down three quarters of an acre of oats in half an hour. These were 28 threaves* of very large sheaves. From 6 to 8 acres may be considered as a fair day's work.

The number of hands attendant on the machine when operating, exclusive of the driver, will vary according to the nature of the crop. In general eight will be sufficient to bind the corn into sheaves, and set it up into stooks, as fast as the machine can cut it down; and if 8 acres be cut down, the expense of binding and stooking will be the wages of one person per acre. Barley is the worst crop to take up, and it always requires ten hands.

In regard to the expense of cutting with this machine, it must of course depend on the facilities which exist for cutting down the crop; but if we take the data which we have already given, we shall see that it is really trifling. We have seen that eight persons can take up, bind, and stook 8 acres of oats. Suppose they receive 2s. 6d. a-day as wages, without victuals, and that the ploughman who manages the machine may cost with his victuals in harvest time 3s. a-day; these give L. 1, 3s. for cutting down 8 acres, or 2s. 10½d. per acre. This would be the expense, on the supposition that no interruption occurred to the operation of cutting down the crop; but we know that many interruptions of work occur during a harvest, which greatly enhance the expenses of cutting. As a more practical guidance, therefore, of the expense, we shall give the actual expenditure of cutting down the crop on a small farm, which raises from 50 to 60 acres of corn every year, producing from 300 to 350 bolls of corn.

* A "threave" consists of two stooks or shocks, of twelve sheaves each, of oats and barley, and fourteen of wheat.

Crop 1826, of 44 acres, cost	L.	23	4	7	or 10/6¼	per acre,
..... 1827, .. 54		21	12	3	... 8/	... .
..... 1828, ... 55		23	1	8	... 8/4¾	... .
..... 1829, ... 58		22	3	3	... 7/7½	... .
..... 1830, ... 56		20	0	0	... 7/	... .
..... 1831, ... 56		15	0	0	... 5/4½	... .
..... 1832, ... 55		10	13	0	... 3/10¼	... .

The crops to 1830 were cut down by shearers hired for the harvest; and the above items are as low as it is possible to obtain under that mode of cutting down corn. The cutting down by threavers, that is, those who cut down and get so much for the threave, generally 3d. per threave for oats and barley, and 4d. for wheat, costs not less than 11s. or 12s. per acre. The three last years' crops of the above statement were cut down by one of Bell's reaping machines, and we can observe that the expense of cutting by it was less than by the other method, and that it decreased as the proper management of the machine was better acquired by the driver. We have no doubt that next year the expense will be as low as we have taken it by supposition, that is, 2s. 10½d. or 3s. per acre, a sum which appears to be a minimum of expense for the quantity of labour performed for it.

With these plain and unexaggerated statements, we will leave Mr Bell's reaping-machine to work its way for a time into public notice and favour.

ON THE ADULTERATION OF CLOVER AND TURNIP SEEDS.

In his curious and amusing book on the "Economy of Machinery and Manufactures," Mr Babbage has placed before the public the various adulterations which are effected by fraudulent persons, in many of the commodities of common life. Some years ago these frauds were so prevalent that they attracted the attention of the House of Commons, before a committee of whom many disgraceful practices were brought to light. Among many others, that of "*doctoring*," as it is termed, clover seeds is the most culpable. It appeared "that the old seed of the white clover was *doctored* by first wetting it slightly, and then

drying it with the fumes of burning sulphur; and that the red clover-seed had its colour improved by shaking it in a sack with a small quantity of indigo; but this being detected after a time, the *doctors* then used a preparation of logwood, fined by a little copperas, and sometimes by verdigris; thus at once improving the appearance of the old seed, and diminishing, if not destroying, its vegetative power, already enfeebled by age. Supposing that no injury had resulted to good seed so prepared, it was proved that, from the improved appearance, its market price would be enhanced by this process from 5s. to 25s. a hundred weight. But the greatest evil arose from the circumstance of these processes rendering old and worthless seed equal in appearance to the best. One witness tried some *doctored* seed, and found that not above 1 in 100 grew, and that those which did vegetate died away afterwards; whilst about 80 or 90 per cent. of good seed usually grows. The seed so treated was sold to retail dealers in the country, who of course endeavoured to purchase at the cheapest rate, and from them got into the hands of the farmers; neither of these classes being at all capable of distinguishing the fraudulent from the genuine seed. Many cultivators, in consequence, diminished the consumption of the article; and others were obliged to pay a higher price to those who had skill to distinguish the mixed seed, and who had integrity and character to prevent them from dealing in it.

This account has confirmed a suspicion which we have long entertained, that old turnip-seeds are subjected to some similar process to make them look like fresh seeds. Though we were in the habit of getting our annual supply of turnip-seed from an extensive dealer in seeds in a large town, some years ago we purchased a few pounds from a seed-merchant in a small but nearest country town, in order to sow the land which the manure had covered farther than we had anticipated it would do. Though this seed looked well in the hand, the plants which came up from it were more scanty than a thinned out crop, and of course in a more irregular manner. On mentioning this circumstance to several of the farmers in the neighbourhood, they corroborated it from their experience of similar losses which they had sustained.

Surely no punishment can be too severe for those fraudulent wretches, who can coolly commit a crime which they know will deprive dumb creatures of the very means of existence; which will wrench from the farmer the fruits of a whole year's labour and anxiety; and which will throw his farm so completely out of its rotation of cropping, that years must elapse before it can be restored to its wonted equilibrium.

We are aware that seedsmen, who are excellent judges of all kinds of seeds, and who deal extensively, cannot be imposed upon by the practices of these quack *doctors;* but the latter take care not to put their poisoned articles into the hands of judges. They send them to the small dealers of seed in all the country towns, from which the greatest number of the small farmers in their neighbourhood obtain their supplies.

In the case of clover-seeds in particular, the farmers in this country and the north of England can receive no warranty from such a species of loss, but by compensation of damages from the seed-merchant, whose whole wealth consists probably of his small stock in trade. But in regard to turnip-seeds the farmers have fortunately the remedy in their own hands. They can raise their own turnip-seed. In case the different kinds of it should be injured by impregnation of the pollen carried away by the bees, or wafted by the wind, it would be advisable for the farmers in a district to agree among themselves to grow the seeds in quantities at considerable distances from one another, and to make exchanges of the kinds desired to be cultivated by each.

There is great difficulty, however, to find a number of farmers who will act in concert even on a subject in which their interests are obviously involved. The easiest remedy, therefore, for them to adopt, in order to avoid the risks of fraud in those seeds which are not raised by themselves, will be to procure them annually from seed-merchants of high character, even though they should cost, by that method of procuring them, a little more cash and trouble.

EXPERIMENTS WITH LIQUID MANURE.

THERE is nothing which conduces so much to the comfort and well-being of live stock, as attention to the minutiæ of management in the winter season. A few examples will illustrate the nature and importance of those minutiæ better than a long process of reasoning. It is much better, for instance, for sheep feeding on turnips, to begin the eating of them from that side of the field which would afford them shelter, by a plantation, or any natural favourable inequality of the ground, where they are proceeding gradually over the field, than by an opposite arrangement, which would leave them exposed to every severity of weather. Nay, the very placing of the straw racks may contribute much to ward off the fury of the blast from a suspected quarter. Should a part, at least, of the older grass which is to be broken up for cropping in the spring, be not left in a rough state for the ewes in winter, they will run the risk of falling off in condition when they are big with young. In such a case, they will wander about in a restless manner, ready to leap through the first gap in the fence they can find, or gather at the gate together, looking through its bars as if praying to be delivered from that scene of starvation. If under drains are not formed in every court, which is appropriated to the use of the cattle in winter; or if even spouts are not placed around the buildings which fence in these courts, to carry off the rain-water, or the superfluous moisture, all the quantity of straw which can be given them will never render their situation comfortable. Instead of having dry litter to repose on, and to keep them warm in the cold nights, the wet straw will chill their abdomen when they lie down, and which is the most tender part of an animal; their legs will be benumbed in wading and poaching through a mire of wet straw, and the very turnips which they eat, though administered in profusion, will only serve to chill still more their already shivering frames. After feeding they will stand with their backs up, heads down, and their feet drawn together into a small space. A comfortable situation will be observed to nourish the condition of cattle in winter more than [illegible] of food placed constantly before them under

unfavourable circumstances. Horses receive far greater injury through inattention to the state of the private roads on a farm, than by any excess of regular work in field labour.

The reflection of a moment will convince any man who is at all observant in these matters, of the truth of these observations; and yet how little are they attended to, especially by the smaller tenantry of the country. To form a small conduit through a cattle court is thought a far more troublesome operation than the grubbing up of cart-loads of whins, and stumps of trees, to take in a small piece more of fresh land; and yet, were tenants to consider seriously the constant daily loss, though it may be imperceptible, which they incur by inattention to the comfort of their live-stock, they would surely see the necessity which exists for draining their courts, and preventing the torrents of rain-water and melted snow from mixing with their farm-yard manure. These they ought to do, while at the same time they should not neglect the improvement of the land.

Drains leading from all the courts and byres occupied by all kinds of animals in the winter season, to a well or pit placed at some convenient spot and distance, would collect a much greater quantity of liquid manure than most people are aware of. If drains were formed, all the excess of moisture only which could not be absorbed by the straw will run into them; so there is no danger of making the farm-yard manure too dry by means of these drains. That excess which is thus economically collected, is preserved from evaporation, or oozing from the dung-hil when taken out of the courts, before the manure can be prepared to be laid on the field. Instead of being lost, could it be applied in any manner beneficially to the soil, over and above the ordinary quantity of manure which the straw produces, so much expense would be saved in purchasing other manure, so much more produce would be raised by it on the farm, while, at the same time, so much more comfort would be conferred on the live-stock which occupy the courts, and furnish this desirable manure. The expense of these drains sinks into insignificance when their good effects are reflected on for a moment.

Experience has already proved the utility of liquid manure in other countries besides our own. All the flax and rape in Flanders are raised with liquid manure. Most of the Flemish

farmers have such a partiality for liquid manure, that they call it *bonsbons*. It is collected into very large cisterns made of brickwork under ground, generally forty feet in length, fourteen feet wide, and seven or eight in depth. This space is generally divided into two, and the older portion of urine is taken away first. They will contain about 40,000 gallons. The moisture is extracted out of them by means of a pump. It is carried to the field either in a large sheet called a *voile*, which is suspended from a cart, and from which two men, standing on the cart, scatter it with hollow shovels on the rolled ground; or it is taken out in a *tonneau* or barrel, containing thirty-eight gallons, by two men with poles, and set down at equal intervals. There are two sets of barrels, which enable the men who deposit the loaded one to bring back the empty one. The Flemish enrich the liquid manure with dissolving rape cake in it. Of this mixture, 2480 gallons, with 864 rape cakes in it of 2 lb. each, are applied to the English acre for the raising of flax. The *vidanges* conveyed from the adjoining towns and villages, are blended with the liquid manure. "This species of manure is relied on beyond any other upon all the light soils throughout Flanders, and even upon the strong lands (originally so rich as to preclude the necessity of manure) it is now coming into great esteem, being considered applicable to most crops, and to all the varieties of soil *."

Praiseworthy as their care in preserving the liquid manure of their farms is, and in which every British farmer may imitate them with advantage, the expedients adopted by the Flemish farmers in its application to the soil are at least clumsy, and inapplicable in a country where manual labour is high. The *voiles* and *tonneaux* will not *pay* in this country.

I have for several years paid considerable attention to the application of liquid manure; and the results of my experiments, which have been carried on in an extensive scale, have enabled me to make some general conclusions which I shall state. I shall, in the first instance, lay before you the details of my practice, that your readers may judge for themselves.

The farm on which the experiments which I am about to

* Radcliff's Agriculture of Flanders.

give the details, consists of a rich black friable loam, resting chiefly on a sandy subsoil, but also on some patches of clay. In 1828 I took, by agreement, all the dung of a dairy which is situate in my immediate neighbourhood, and which contains from thirty-five to forty, and sometimes seventy cows. I made a cistern for the liquid manure in the dung-court, into which all the urine from the byre was collected. The supply generally amounted to about 360 gallons a-week. The liquid is taken out to the fields in a large butt containing 120 gallons, placed on wheels like a cart, and to the hinder part of which is attached a wooden box, perforated with holes, through which the liquid runs out of the butt upon the ground, as if out of a gigantic watering pan.

I have tried the effect of this liquid manure upon every species of crop, but all are not affected alike by it. My plan is to apply it to the young grass, after it has been eaten with sheep, which are put on immediately after the corn crop has been removed from the ground. This may be in October. The quantity allowed is 20,000 gallons per imperial acre. The after-growth is not much increased, but the grass has a fresh green appearance all winter; and it can be cut a month earlier than the rest, which has not been so treated. In March, even, it affords a full bite to young stock. I find that this manure applies best to grass. The produce of the grass is about doubled by it; but should the grass be wanted for pasture, and not for cutting, the manure should not be applied later than December, as, when it is applied so late as February, the cattle are rather shy in eating the grass. Perhaps the grass may have a bitter taste, from luxuriance of growth.

The effect, when applied to clover-lea which is to be broken up for oats, is very perceptible. The increase of crop is next to that of the clover, being about one-third.

For wheat it answers well on the lighter soil; but on stiff or clay land, it does no good to wheat; and if it is laid on when the land is wet, it is of no perceptible value to the wheat crop. Under proper circumstances, the wheat crop will be increased about one-fourth.

With barley, it does not do at all. The bulk of crop

raised is very great, but the straw being too soft, the crop lodges to destruction. It is therefore inexpedient to apply it to barley.

Potatoes grow to a very large size with liquid manure; but they are watery, and quite unfit for the table. I have found, however, when I applied a little dung along with the liquid manure, that the potatoes are much improved in quality, and adapted to the use of families. I would not recommend the use of liquid manure to the potato crop, when clover-lea can be obtained for its application.

With regard to the turnip-crop, liquid manure is not half so efficient as dung. Unless, therefore, fermented dung is used along with it, it is of little value to the turnip-crop; and it affords, besides, scanty nourishment to the crop succeeding the turnip.

The white globe turnip yields the largest supply of liquid manure; but its effect on any crop is less distinguishable than that from yellow turnip or the ruta-baga. The effect of the latter is not only more apparent during the whole season, but the produce in grain is really greater than from the former. The liquid from cut grass, may be ranked with that from the white globe turnip. The liquid manure from distillery refuse, such as grains and dreg, is very good.

With whatever crop it be used, I have found it succeed best when it is laid on after a shower, or when the ground is moist. When applying it during sultry weather in summer, it is of advantage to mix one-third of water with it; but this is not requisite at all in spring and autumn. Perhaps the water may supply the evaporable quantity of matter, which is constantly arising from the earth's surface in summer, and thus permit the residuary substance, which is the manure, to remain in the soil. The expense of this kind of manure is about L. 2 per acre, including tolls, men's wages, horse labour, &c.; and excluding any charge for the material. Hence it is obvious, that liquid manure will not pay the expense of driving it from a distance. From all my observations, I do not think that it remains very long in the ground, but that it is exhausted by two or three

The extent of ground watered with this liquid manure,—

In the year 1828, was 40 imperial acres,
... ... 1829, ... 30 ... ...
... ... 1830, ... 46 ... ...
... ... 1831, ... 50 ... ...
... ... 1832, ... 80 ... ...

I think it may be proper to mention, that the half of the 50 and the 80 acres watered in 1831 and 1832, were watered again after the first crop of clover was cut off them, that the real quantity of liquid manure applied in these seasons may be more accurately ascertained.

R. B.

MISCELLANEOUS NOTICES.

I. *Irish Trade with England.*—Some idea of the extent and importance of the trade between Ireland and England may be formed from the following list of articles imported into England during the year 1831.

Horses,	155		at	£20	0	0	each	£3,100	0	0
Cows,	6,821		"	8	0	0	"	54,568	0	0
Calves,	285		"	1	0	0	"	285	0	0
Sheep,	13,218		"	1	0	0	"	13,218	0	0
Lambs,	1,314		"	0	6	8	"	438	0	0
Pigs,	89,700		"	0	10	0	"	44,850	0	0
Mules,	243		"	10	0	0	"	2,430	0	0
Bacon,	15,090	bales,	"	2	10	0	"	37,725	0	0
Pork,	17,746	barrels,	"	3	0	0	"	53,238	0	0
Beef,	9,445	tierces,	"	5	10	0	"	51,947	10	0
Hams and Tongues,	970	hhds.,	"	3	0	0	"	2,910	0	0
Lard,	8,452	firkins,	"	2	10	0	"	21,130	0	0
Butter,	504,047	firkins,	"	3	0	0	"	1,512,141	0	0
Eggs,	3,508	crates,	"	2	0	0	"	7,016	0	0
Wheat,	377,060	quarters,	"	2	10	0	"	942,650	0	0
Barley,	313,458	,,	"	1	10	0	"	470,187	0	0
Oats,	460,786	,,	"	1	0	0	"	460,786	0	0
Rye,	560	,,	"	1	10	0	"	840	0	0
Peas,	2,736	,,	"	1	10	0	"	4,104	0	0
Beans,	10,456	,,	"	1	10	0	"	15,684	0	0
Malt,	8,650	,,	"	2	10	0	"	21,625	0	0
Flour,	113,194	sacks,	"	2	10	0	"	282,985	0	0
Meal,	250,860	loads,	"	1	10	0	"	376,290	0	0
			Total value,					£4,380,147	10	0

—*Communicated by Mr Barlas.*

II. *Comparative Wealth of England and France.*—

Cultivated land in France, . 27,440 square leagues.
Ditto in England, . 13,396 ditto.

Yet the gross produce of England is one-seventh more than France, and nett produce double. Agricultural population in England, one-third of the whole population: in France they form two-thirds. In England, 7,511,682 farmers, husbandmen, and labourers, cultivate 21,000,000 acres, and produce annually a net income of L. 107,246,000; while in France, 19,621,000 persons, cultivating 41,000,000, can only produce an income of L. 57,788,120. Hence the super-productiveness of the soil of England. Its superiority, however, may be attributed in some degree to the manner in which property is divided in France. Number of proprietors in England and Scotland in 1816 was 589,384; add one-third more for Ireland, which, at five members to one family, give 4,000,000 of persons, or one-fifth of the whole population; but in France in 1818, there were 4,833,000 landowners, which, at five members to one family, gave 24,000,000 persons, or four-fifths of the population. Number of properties in France under 52s. annual value, is three millions and a half. Hence in England, one-half of the population is employed in commerce; in France only one-sixth; a superiority to England almost incalculable, when we take into calculation the extensive use of machinery.—*M. Regney, from the Revue Encyclopedique.*

III. *Statistics.—From a Statement printed by order of Parliament, March* 1816.

Number of Persons.		*Persons in Trade and Professions.*	
Occupiers of Land under L. 50 per annum,	114,788	Under L. 50 per annum,	100,760
Ditto from L. 50 to L. 150 per annum,	432,534	Above L. 50 and under L. 150,	117,306
Ditto above L. 150 per annum,	42,062	From L. 150 to L. 1000,	31,928
		From L. 1000 and upwards,	3,692
Total Agriculture,	589,384	Total Trades and Professions,	253,686

Assessments to Property-Tax, 1814–15.

Schedule A, Landlords,	L. 4,297,247	Schedule D, Trade,	L. 2,000,000
——— B, Tenants,	2,176,228		
Total from Land,	L. 6,473,475		

Profits on the Productions of the Soil and Manufactures of Great Britain and Ireland, in 1813.

Agriculture,	L. 97,590,608	Manufactures in every branch at 12½ per cent. profit,	L. 14,278,750
Mines, Minerals, Coals, &c.	2,250,000	Inland Trade in all its branches,	3,937,500
Total Soil,	L. 99,840,608	Foreign Commerce and Shipping,	5,796,718
		Coasting Trade,	250,000
		Fisheries,	262,500
		Chartered and Private Bankers,	3,500,000
		Total net profit to the Nation from Commerce & Manufactures,	L. 28,025,468

Protection afforded to Manufactures, by Duty, as under.

Baskets per cent.	L.	37	10	0	Gauze of Thread,	L.	40	0	0
Bottles of Glass,		72	0	0	Glass,		72	0	0
Boxes,		37	10	0	Hats each,		1	1	6
Brass Manufactures,		37	10	0	Hides, Tanned, &c. per cent.		90	0	0
Candles per cwt.		2	0	0	Leather, any article made of,		90	0	0
Capes, Cotton, per cent.		54	0	0	Steel,		37	10	0
Carpets per cent.,		37	10	0	Telescopes,		37	10	0
Carriages of all sorts,		37	10	0	Thread Cotton,		54	0	0
China-Ware,		50	0	0	Woollen Cloths, all manner of, per yard,		1	1	6
Clocks,		37	10	0	Worsted,		37	10	0
Cotton Manufactures,		54	0	0					
Earthen-Ware per cent.		50	0	0					

IV. *Remarkable Elevations.*

	Height in Feet.
Convent of St Bernard (above the line of perpetual snow, which is here 8033 feet)	8,606
Convent of St Gothard	4,900
Lake Luçon, in Switzerland	6,220
Lake Lucerne, ditto	6,380
Lake Geneva, ditto	1,207
Line of perpetual snow in Scotland	3,750
Edinburgh City	443
St Paul's Cathedral, London	400
Daba, near the source of the Sutledj, in Thibet	15,700
Manasarooa Lake, in Thibet	14,500
Milum Temple, near the source of the Ganges	13,000
Highest flight of the Condor on the Andes	21,000
Ascent of Gay-Lussac, at Paris, in 1804; the greatest height ever attained by a balloon	22,900
Longwood House, St Helena	2,000
Pyramids of Egypt	475
Greatest altitude obtained by Messrs Humboldt and Bonpland, on Chimborazo, in 1802	19,400
Farm of Antisama, the highest inhabited spot on the Andes,	13,435
Greatest altitude of pines in the Torrid Zone	12,800
Ditto of trees, the pines excepted	11,100
Ditto of oaks	10,500
City of Quito, in South America	9,630
Mine of Real del Monte, in Mexico	9,120
Falls of Niagara, in North America	700
Highest growth of Peruvian Bark	9,500
City of Mexico	5,700

V. *On the Benefit of Field Gardens for the Labouring Poor.* By Capt. Scobell, R. N.—This is truly turning the sword into the ploughshare; and we are glad to find a son of Neptune so usefully and benevolently employed. In these short but pithy observations, Captain Scobell calls for unanimous and remedial measures to recover and retain the better feelings of the misguided labourers; and then points out the manifest advantages of assisting them by granting small portions, according to their wants, of good land at a fair rent. This, though no loss to the large landed proprietors, is an infinite assistance

to poor labouring families, as instanced at Midsomer, Norton, and High Littledon, near Bath, especially at the former, where no less than thirty acres being shared among 132 labourers, they cultivated the ground with great alacrity and thankfulness, and brought in the rent with the utmost punctuality. The present seems a time that peculiarly calls upon the affluent to attend to such a rational way of assisting poor labourers; for their minds have unfortunately been misled by designing rioters, who having nothing themselves to lose, do not care what effects their attempts to produce a general scramble may have. Many charities have been ill arranged from the beginning—others have been subsequently mismanaged—and most of them, we regret to say, have a tendency to diminish that forethought for old age and sickness, without which the lower classes must degenerate into paupers. But the system here recommended of giving them gardens at a reasonable rent,—for instance, the land alluded to near Bath was let at 5¼d. per pole, or L. 3, 10s. per acre, including the maintaining of fences, parish rates, and tithes,—this system, we repeat, is free from all objections, and teaches the labourers' *families* also to cultivate to the best advantage, and to economise their time, instead of loitering about public houses. We hear of the most beneficial results from all parts of England, where field gardens have been granted; and, independent of Captain Scobell's report, we have also *seen* their good effects, and shall truly rejoice if this encomium on "letting small portions of good land to the labouring poor" should induce any more landholders to adopt this really patriotic principle. We will be content for the present with a glance at the author's farther views: "Though I do not include, in the inducements for adoption, the prospective reduction of poor-rates, it is not that it might not be available, to strengthen my opinions, but rather that I would be the advocate of the system on higher and more generous motives." Having explained and recommended his ideas, the Captain concludes thus: "On the plan to which I have directed attention, I have reflected much; and I again record my deliberate conviction, that if the landed proprietors will *themselves* take the matter in hand—allot good land for a series of years at a farmer's rent—mix no *paupers* with the self-maintaining labourers—and allow no parish-officers, *as such*, to appear in the arrangements—that a system of field gardens so constituted would act as a talisman on the rural population." Though we think Captain Scobell perfectly right in requesting good land for the labouring classes, we think the project of cultivating the poorer soils ought not to be lost sight of. All our attempts hitherto have failed from impatience, and the aversion of speculative economists. But what is in the power of human labour properly applied upon any soil, may be estimated when passing between heaths, and merely looking at the land which here and there surrounds a detached cottage, forming a contrast with the adjacent waste, as striking as that of an oasis in the desert. The cause of this difference of fertility is sufficiently obvious; and when the improvers are assisted in the outfit, appears to be perfectly manageable. It is by such means that large tracts have been reclaimed from sterility in the Netherlands; and though the process was slow, the productive power of the soil has been raised to a profitable pitch. But it must not be forgotten, that the success was the result of clear and well arranged calculation rather than the momentary impulse and sanguine excitement by which

such measures are usually promoted'; and, in the hope of sudden wealth, the projectors have too often forgot the slow march in which nature indulges.—*United Service Journal.*

VI. *Agricultural Employment.*—Respected Friend,—I consider it my duty to address thee on the subject of the public meeting which took place a few days ago at the London Tavern (at which I had the honour to preside), of the United Kingdom Agricultural Employment Society. If full employment were given to the agricultural labourers all over the country, and I am bold to say I quite believe this might be done, were an act of Parliament passed to enforce the general adoption of the labour-rate plan, on the same basis, and according to the system, which was brought forward at Aylesbury, and which I understand has been successfully adopted there for three years past, this would not only furnish employment for all the labourers in the country, but also for the mechanics and artisans in the towns. But, while this plan is not acted upon, there appears no other method of finding employment for our unoccupied population, but that of forming home colonies, similar, in some respects, to that in Frederick's Oord in Holland. Evidence has been received from many most respectable persons in various parts of England, that an industrious man may derive a profit of from L. 10 to L. 15 per acre, and in some instances, even more (varying, of course, with the seasons and with the quality of the soil), from the spade cultivation of one acre of land. It may appear strange that this should be the case, when the farmers are complaining of losing money by their land all over the kingdom, except in peculiarly favoured situations; but this mystery can easily be solved. The farmer has to pay wages and to keep horses, &c., before he can derive a profit, but the labourer, who does all the work himself on his single acre farm, pays himself by the produce of his soil to the same amount as would be paid by the farmer for wages and for the keep of horses, &c., with the additional profit arising from the increased produce resulting from *spade* culture over and above that of the plough; so that, judging from the above data that an able-bodied man can obtain a good livelihood from the spade cultivation of five acres of land, provided he has the land at the same rent as the farmer, I propose that another public meeting should be held, at which the plan may be coolly and fairly discussed; and I trust the Agricultural Society will be furnished with means to try this experiment on a small scale, which appears to me to be of such momentous importance to the country at large. Suppose they were to borrow L. 24,000: with this they may purchase 500 acres of good land, and erect 100 cottages, and pay the lender 4 per cent. for his money, and keep in hand 11 per cent. for exigencies for the support of the sick, and any that may be disabled by accident, &c.

500 acres of land, at L. 20 per acre, will cost, . .	L. 15,000
100 cottages will cost, at L. 60 each, ...	6,000
Implements and sundry expenses the first year . . .	1,000
Furniture for the cottages, &c. &c.	2,000
	L. 24,000

So that the Society may let an industrious man a good cottage and five acres of land at the rate of L. 5 per cent., for L. 12 per annum. But if the Society

can obtain a grant of a tract of land, it will not cost more to locate a single family than about L. 70; and the family may have their cottage and five acres of land for a rental of L. 4 per annum. It is apprehended that the parishes to which they belong will be willing to support the industrious poor who are located in these five acre farms for the first year, till they can obtain a return for their labour. I am thine respectfully, JOHN HULL.—Hillingdon, near Uxbridge, 10th of 9th month, 1832.—*Letter in Buck's Herald.*

VII. *Rules for Managing Cottagers' Allotments.*—The following plain rules are addressed to Landowners and Farmers, by the strict observance of which it has been found, from long experience, that the labouring poor may be rendered comfortable and comparatively independent, and the poor rates in almost all agricultural parishes may be made nearly nominal. By the Rev. Joseph Wilton, Minister of Laxton, Northamptonshire:—

(1.) *Cottages and Land.*—1. To each cottage apportion, as near to it as possible, one quarter or one-third of an acre of land, at a moderate yearly rent, according to its quality. 2. Do not allow of more cottages than the extent of the parish really requires. 3. See that the cottages are kept in good repair, and preserved dry, and well white-washed within.

(2.) *Labour and Wages.*—1. For really productive labour, always give a labourer good and liberal wages, without any reference to his being married or single. 2. Whenever you can, set the labourers their work by the task, or great. 3. Never allow of rounds-men. 4. Never permit of any part of a man's wages to be paid out of the poor-rate. 5. As the labourer should always receive good and liberal wages for productive labour, so, on the other hand, when the labourer is employed on mere parish work, he should have hard work and short wages, and his work by the task or great. 6. See that the very aged, the sick, and the infirm, are kindly treated.

(3.) *Religion, Morals, and Parish Economy.*—1. See that the children of the labouring poor have a christian education, in a well-regulated and conducted school. 2. Enforce by all proper means, a regular attendance of all the people on public worship at the parish church. 3. Allow of no more public-houses than are absolutely necessary. 4. Discourage, in every proper way, all tippling and drinking. 5. Discourage to the utmost degree all lewdness and improvident marriages. 6. Never force a marriage in order to prevent a child being born illegitimate; but put the law fully in force against the mother, by committal to prison, if she make the illegitimate child chargeable to the parish. 7. Purchase fuel in summer, to be sold out to the labouring poor at a cheap rate in winter. 8. Patronize and promote Clothing Societies. 9. Endeavour to influence the poor to unite in Friendly Societies, and to put whatever money they can save in some Savings Bank. 10. Administer the poor laws firmly and rigidly.

VIII. *Plan for promoting the Employment of superfluous Labouring Population, and at the same time conferring a great Benefit on the Land.*—Nothing can be more unwise and injurious than the system commonly adopted in parishes for employing those labourers who are not engaged by the farmers, and therefore chargeable generally on the rates. They are usually set to work, or rather told to set themselves to work, on a road, where there is no one to look after them, and where, consequently, the work performed by them is nearly

or altogether, useless; and where, from being frequently assembled in gangs of large numbers, they learn to encourage each other in idleness, discontent and every kind of vice. On the other hand, it is acknowledged by all, that the land of nearly every farm in the county would be greatly benefited, if some of the labour thus wasted could be turned on it. A plan is here submitted, as some remedy for these evils, which has already been tried in several parishes, under various circumstances, and which has been attended with uniform and complete success in all, where it has been strictly adhered to. In every parish where there are many able-bodied men thrown upon the rates, let the overseers be authorised by a vestry (under the provisions of the new act) to make an abatement of a portion of the poor-rate (not exceeding one-half or one-third) to every rate-payer, who will expend that sum in employing labourers, at the fair rate of wages, over and above those men ordinarily employed by him.

The above is merely the outline of the plan: its details and arrangements will be found in the following resolutions. Only let it be borne in mind that the same money must be expended; for the people must be maintained somehow by the occupiers of the soil: whether profitably or not depends on the course pursued:—1. That the overseers now in office be empowered to make an abatement of the poor-rate (not exceeding one-third) from any one who will employ labourers, who are parishioners, to a corresponding amount. 2. That no person can claim such abatement for any labourers who are parishioners, except such as are over and above the proportion of one man or three boys for every L. 40 rental: one son above sixteen, and only one, may be considered as a labourer. 3. That every occupier of land, who desires such abatement, shall first obtain leave from the overseers, specifying the names of those already employed by him; and shall for each week make a return of the names of all those employed by him under this arrangement, and also for their wages and the number of days he has employed each of them: and that the overseer shall also keep an account, with the name of the farmer, to whom such abatement is allowed, what that abatement is, and the names of the labourers thus employed; which account and which return shall both be produced to the vestry at the same time as the other accounts of the overseers. 4. That the overseers grant permission to whomsoever applies first; and if two or more apply at once, then to the highest rate-payer (for a time not exceeding two weeks), and no one person shall have the abatement for two men while another is prevented from obtaining it for one man. 5. That no person shall claim such abatement who has not settled the whole of all previous rates due from him. 6. That, as it appears that 9s. per week is a fair rate of wages at present, no more than that sum per week shall be abated for any one labourer employed under this arrangement.

These resolutions have been drawn up, and since revised with considerable care, after a full trial of their effects; they are now therefore recommended with great confidence as to their success in nearly all parishes, where they are strictly observed in every particular. This is extremely necessary; for it is not every one who can perceive how a very slight difference in arrangement may produce a very wide difference in the result. In particular, to attain the greatest possible benefit from the system, the following points should be considered as especially requisite: 1. An active overseer, willing

and able to keep the accounts in the third resolution clear and distinct. 2. That it be the permanent and settled system of the parish, whenever there is an apparent want of work; not acted on one year, and then either given up or done carelessly. 3. That the surplus labourers be taken up, as well as others, by the farmers, and paid by them in the ordinary manner as much as possible: instead of being forced to apply first to the overseer for work, and then be sent by him to some particular farmer, and afterwards perhaps to be ordered back, to take his wages at the parish table; all which is the harassing and mischievous practice at present in some parishes; harassing both to the overseer and to the labourer. 4. That no difference be made in the abatement for single or for married men, if equal in value.—If these points were well attended to, we might generally expect to reap the following advantages. 1. The labourer would become by degrees industrious and contented, would again have a motive for diligence and good conduct, and would be spared the humiliation of applying to the overseers for labour. 2. There would be less inducement to early marriages. 3. The office of overseer would be delivered from a vast deal of vexation and trouble, and from the constant irritation it is exposed to. 4. The land would be better cultivated: and, therefore, 5. The farmer would be benefited. 6. Many persons would be tempted to employ more labourers in ornamental works, and from which a profit in money is not sought; as no additional expense would be incurred. 7. It is the only system proposed that is not compulsory. The farmer may adopt it, or not, as he pleases; both he and the labourer are free to make what contract they please; while, at the same time, the gain is so obvious, that few will be found willing to miss their share of it.

Note.—It should be observed, that the above differs from the "Roundsman System;" for that is compulsory on both farmers and labourers, and therefore hateful to both;—and differs also from a strict "Labour Rate;" for that is a separate and distinct and additional rate, to which there are many objections.—After all, it must be remembered that every thing of this kind is only a temporary relief from a pressing evil, the radical cure for which must be sought in other measures; of which the "Cottage Allotment System" is capable of being made a very efficient one.—*Buck's Herald.*

IX. *Ancient Price of Labour.*—In the year 1352, 25th Edward III, wages paid to haymakers was but 1d. a-day. A mower of meadows 3d. per day, or 5d. an acre. Reapers of corn, in the first week of August 2d.; in the second, 4d., per day, and so on, till the end of August, without meat, drink, or other allowance, finding their own tools. For thrashing a quarter of wheat or rye, 2½d.; a quarter of barley, beans, peas, and oats, 1½d. A master carpenter, 3d. a-day, other carpenters 2d. per day. A master mason 4d. per day, other masons 3d. a-day; and their servants 1½d. per day. Tilers 3d., and their knaves 1½d. Thatchers 3d. per day: their knaves 1½d. Plasterers, and other workers of mud walls, and their knaves, in the like manner, without meat or drink, and this from Easter to Michaelmas; and from that time less, according to the direction of the justices.—By the 34th of Edward III, 1361, chief masters of carpenters and masons, 4d. a-day, and the others 3d. or 2d. as they were worth.—By the 13th Richard II, 1389, the wages of a bailiff of husbandry, 13s. 4d. per year, and his clothing once a year at most; the master 10s.; the carter, 10s.; shepherd, 10s.; oxherd, 6s. 8d.; cowherd, 6s.

4d.; swineherd, 6s.; a woman labourer, 6s.; a day labourer, 6s.; a driver of plough, 7s. From this time up to the time of 23d Henry IV, the price of labour was fixed by the justices by proclamation.—In 1445, 23d Henry IV, the wages of a bailiff of husbandry was 23s. 4d. per annum, and clothing of the price of 5s., with meat and drink; chief hind, carter, or shepherd, 20s.; clothing 4s.; common servant of husbandry, 15s.; clothing, 3s. 4d.; woman servant, 10s.; clothing, 4s.; infant under fourteen years, 6s.; clothing 3s. Freemason or master carpenter, 4d. per day; without meat or drink, 5½d. Master tiler or slater, mason, or mean carpenter, and other artificers concerned in building, 3d. a-day, without meat and drink, 4½d.; every other labourer 2d. a-day, without meat or drink 3½d.; after Michaelmas to abate in proportion. In time of harvest, a mower 4d. a-day; without meat and drink, 6d.; reaper or carter, 3d. a-day, without meat and drink, 5d.; woman labourer, and other labourers, 2d. a-day, without meat and drink, 4½d. per day.—By the 11th Henry VII, 1496, there was a like rate of wages, only with a little advance; as, for instance, a freemason, master carpenter, rough mason, bricklayer, master tiler, plumber, glazier, carver, joiner, was allowed from Easter to Michaelmas to take 4d. a-day, without meat and drink 6d.; from Michaelmas to Easter to abate 1d. A master having under him six men, was allowed 1d. a day extra.—By the 6th of Henry VIII, 1515, the wages of shipwrights were fixed as follows: A master ship carpenter taking the charge of the work having men under him, 5d. a-day in the summer season, with meat and drink; other ship carpenter, called a hewer, 4d.; an able clincher, 3d.; holder 2d.; master calker, 4d.; a mean calker, 3d.; a day labourer by the tide, 4d.

X. *Chimney Soot as a Manure.*—This article is said to be an excellent manure, if properly applied. It is generally mixed up with earth and dung as a compost; in this state it is worth little or nothing; but when properly applied, by being kept dry, and sown on young wheat, clover, or vetches, in March or April, its effects are most extraordinary; in a few days the yellow sickly plants will assume a dark green, which is as much a test of health in plants as the rosy cheeks of a dairy-maid. The fact is, plants receive nearly as much nourishment from the air as the roots; and as the soot is throwing off abundance of gases, which are imbibed through the pores of the leaves, it gives a healthful vigour to the plant, and enables it to throw forth its roots to supply nourishment during the stages of blossoming and perfecting the seed.—*Repertory of Inventions*, No. 92.

XI. *On the Cultivation of Hemp.*—The soils most suited to the culture of this plant, are those of the deep, black, putrid vegetable kind, which are low, and rather inclined to moisture; and those of a deep, mellow loamy, sandy description. To render the land proper for the reception of the crop, it should be reduced to a fine state of mould, and clear from weeds by repeated ploughings. In many instances it will require being dressed with well-rotted manure. The quantity of seed sown per acre is from two to three bushels; but as the crops are greatly injured by standing too closely together, two bushels, or at most two bushels and a half, will be generally found sufficient. In the choice of seed, care should be taken that it is new and of a good quality, which is known by its feeling heavy in the hand, and being of a bright and shining colour. The best season for sowing it in the southern districts is, as

soon as possible after the frosts are over in April; and in the more northern districts, towards the close of the same month, or beginning of May. The most general method of sowing it is broadcast, and afterwards covering it by slight harrowing; but when the crops are for seed, drilling it in rows at small distances may be advantageous. This sort of crop is frequently cultivated on the same piece of ground, for a great number of years, without any other kind intervening; but in such cases manure is required in pretty large proportions. It may be also sown after most sorts of grain. When hemp is sown broadcast, it in general requires no after culture; but when it is drilled, a hoeing or two will be found advantageous. In the culture of this plant it is particularly necessary that the same piece of land should contain both male and female, or what is sometimes called frimble hemp: the latter contains the seed. When the crop is ripe, which is known by its becoming of a whitish yellow colour, and a few of the leaves beginning to drop from the stems, which happens generally in about thirteen or fourteen weeks from the period of its being sown, it must be pulled up by the roots, in small parcels at a time, by the hand, taking care to shake off the mould well from them before the handfuls are laid down. In some districts the whole crop is pulled together; while in others, which is the best practice, the crop is pulled at different times, according to its ripeness. When, however, it is intended for seed, it should be suffered to stand till it is perfectly ripe. After the hemp is pulled, it should be tied up in small parcels; and if for seed, the bundles should be set up in the same manner as corn, till the seed becomes dry and firm: it must then be either thrashed on cloths in the field, or taken home to the barn. The after management of hemp varies greatly in different places; some only *dew-ripen* or *ret* it, whilst others *water-ret* it. The last process is the best and most expeditious: for by such process, the grassing is not only shortened, but the more expensive ones of breaking, scratching, and bleaching the yarn, are rendered less violent and troublesome. After having undergone these different operations, it is ready for the purposes of the manufacturer. The produce of hemp-crops is extremely variable: the average is generally about five hundred weight per acre. Hemp, from growing to a great height, and being very shady in the leaf, leaves land in a very clean condition; hence it is sometimes sown for the purpose of destroying weeds, and is an excellent preparation for wheat crops.—*Bucks Herald.*

XII. *Butter.*—Butter is extensively used in this and most northern countries: that of England and Holland are reckoned the best. In London, the butter of Epping and Cambridge is in the highest repute: the cows which produce the former feed during summer in the shrubby pastures of Epping Forest; and the leaves of the trees, and numerous wild plants which there abound, are supposed to improve the flavour of the butter. It is brought to market in rolls from one to two feet long, weighing one pound each. The Cambridgeshire butter is produced from cows that feed on part of the year on chalky uplands, and the other on rich meadows or fens: it is made up in long rolls like Epping butter, and generally salted or cured before being brought to market; the London dealers, having washed it and wrought the salt out of it, frequently sell it for Epping butter. The butter of Suffolk and Yorkshire is often sold for that of Cambridgeshire, to which it is little in-

ferior. Somersetshire butter is thought to equal that of Epping: it is brought to market in dishes containing half a pound each; out of which it is taken, washed, and put into different forms, by the dealers of Bath and Bristol. Gloucestershire and Oxfordshire butter is very good; it is made up in half pound packs or prints, packed up in square baskets, and sent to the London market by waggon. The butter of the mountains of Wales and Scotland, and the moors, commons, and heaths of England, is of excellent quality when properly managed; and, though not equal in quantity, is superior to that produced by the richest meadows. Considerable quantities of butter are made in Ireland, and it forms a prominent article in the exports of that country; it is inferior to that of England. Some of the best Irish butter brought to London, after being washed and repacked, is sold as Dorsetshire and Cambridgshire butter. The salt butter of Holland is superior to that of any other country; large quantities of it are annually exported. It forms about three-fourths of all the foreign butter we import. The production and consumption of butter in Great Britain is very great. The consumption in London may be averaged at about one-half pound per week for each individual, being at the rate of 26 lb. a year; and supposing the population to amount to 1,450,000, the total annual consumption would be 37,700,000 lb., or 16,830 tons; but to this may be added 4000 tons for the butter required for the victualling of ships and other purposes, making the total consumption in round numbers 21,000 tons, or 47,040,000 lb., which, at 10d per lb., would be worth L. 1,960,000. The average produce per cow of the butter dairies is estimated by Mr Marshall at 168 lb. a year; so that, supposing we are nearly right in the above estimates, about 280,000 cows will be required to produce an adequate supply of butter for the London market. But the consumption of butter in London has sometimes been estimated at 50,000 tons; which would require for its supply upwards of 666,000 cows,—*Saturday Magazine*, No. 9.

XIII. *Adulteration of Bread.*—Although pure and nutritious bread is so necessary to health and life, there is no article in which fraud and deception are more frequent. The practice of mixing potatoes with the dough has been frequently noticed. Potato-starch is used for adulterating flour. Of this I have a positive proof, even in the present day. A few months ago, an eminent flour-factor showed me a powder, which, he said, had been sent him as a substance which might be mixed with flour without discovery, and requested me to examine it, declaring his intention, at the same time, of publishing the transaction. Inspection alone was sufficient to convince me that the powder was potato-starch, and a few experiments soon decided the point. This fraud has no other bad effect, than in lessening the quantity of nutritious matter, which a given quantity of the bread should contain; beside the extortion of charging full price for an article of less value. Inspection by a high magnifier will detect potato starch in flour, by its glistering appearance. We have heard of bones burnt to whiteness, and ground to a powder, being used to adulterate *thirds* flour, which, being of a somewhat gritty nature, will disguise the grittiness which it is almost impossible to deprive bones of, be they ever so laboriously ground. This fraud is easily detected, for if weak dilute muriatic acid, that is, spirit of salt mixed with water, be poured on such flour, there

will be an effervescence or boiling up; and if this liquid be thrown on a filter of paper, the portion which runs through the paper will let fall a heavy white deposite, if pearl-ash be added. Chalk and whiting are also adulterations which, in small quantity, are often mixed with flour; and though such admixtures are not noxious to health directly, they are injurious in many ways. They may be readily detected by pouring in a small quantity of oil of vitriol, mixed with six or seven times its weight of water; if an effervescence ensue, it is proof that there is an adulteration, and if, after filtration as before directed, the addition of pearl-ash to the clear liquid produce no muddiness, or a very slight degree of it, the presumption is, that the adulteration was chalk or whiting. Alum is a well-known adulteration of bread, not used on account of its quantity, but to disguise a bad quality of flour: it is used to whiten ill-coloured flour, and to harden and whiten bread made from wheat which has been malted. By some respectable bakers, it has formerly been used, and might still be used, if there were not a law against it, with perfect safety: in so small a quantity as half-a-pound of alum to one hundred-weight of flour, it could not be in the least degree injurious; for this would be but 9-35ths of an ounce to a quartern-loaf. When used in double this quantity, as it often is, it becomes discoverable to the taste when the bread grows stale. Be this as it may, we can easily detect alum in bread, for it is only in bread that it need be suspected, by pouring boiling water on it, letting it cool, pressing out the water, boiling it away to one-third, allowing it to cool, filtering it through paper, and adding to the clear liquid some solution of the muriate of lime. If a considerable muddiness now appear, it is proof of adulteration, and none other can well be suspected than alum. Muriate of lime can readily be prepared by pouring a little dilute muriatic acid on more chalk than it can dissolve, and after the effervescence ceases, filtering the liquor through paper. What passes through the paper is ready for use as a test. Salt, which, in small quantities, is necessary to the flavour of bread, is used by fraudulent persons as an adulteration, for a large quantity of it added to dough, imparts to it the quality of absorbing, concealing, and retaining, a much greater quantity of water than it otherwise would. Bread made from such dough will, on leaving the oven, come out much heavier than it ought, and the additional weight will be merely water. Fortunately, the taste of such bread is a sufficient index to its bad quality; it is rough in its grain, and has the remarkable quality, that two adhering loaves will generally separate unevenly, one taking from the other more than its share.—*Treatise on Domestic Economy.*

XIV. *Loss of Weight in Cooking Animal Food.*—It is well known that, in whatever way the flesh of animals is prepared for food, a considerable diminution takes place in its weight. As it is a subject both useful and curious in domestic economy, we shall give the results of a set of experiments, which were actually made in a public establishment: they were not undertaken from mere curiosity, but to serve a purpose of practical utility. 28 pieces of beef, weighing 280 lb., lost in boiling 73 lb. 14 oz. Hence the loss of beef in boiling was about 20½ lb. in 100 lb.: 19 pieces of beef, weighing 190 lb., lost in roasting 61 lb. 2 oz. The weight of beef lost in roasting appears to be 32 lb. per 100 lb. 9 pieces of beef, weighing 90 lb., lost in baking 27 lb. Weight lost by beef in baking is 30 lb. per 100 lb. 27 legs of mutton, weighing 260 lb.

lost in boiling, and by having the shank-bones taken off, 62 lb. 4 oz. The shank-bones were estimated at 4 oz. each, therefore the loss in boiling was 55 lb. 8 oz. The loss of weight in legs of mutton boiling is 21 lb. per 100 lb. 35 shoulders of mutton, weighing 350 lb., lost in roasting 109 lb. 10 oz. The loss of weight of mutton in roasting was 31½ lb. per 100 lb. 16 loins of mutton, weighing 141 lb., lost in roasting 49 lb. 14 oz. Hence loins of mutton lose by roasting about 35½ lb. per 100 lb. 10 necks of mutton, weighing 100 lb., lost in roasting 32 lb. 6 oz. From the foregoing statement, two practical inferences may be drawn. 1st, In respect of economy, it is more profitable to boil meat than to roast it. 2d, Whether we roast or boil meat, it loses by cooking from one-third to one-fifth of its whole weight.—*Philosophical Magazine.*

XV. *To raise Peas in Autumn.*—The purple-flowered peas are found to answer best for a late crop in autumn, as they are not so liable to be mildewed as many of the other sorts, and will continue flowering till the first frost stops them. Those peas may be sown in July, August, or so late as the first week in September, if sown in a warm sheltered situation, and in a soil inclining to sand. Soak the peas in warm milk, and after you have drawn the drills, water them before you sow the peas: it is best to sow them towards the evening. If the autumn should prove very dry, they will require frequent watering. When peas are sown before winter, or early in spring, they are very apt to be eaten by mice. To prevent this, soak the peas for a day or two in train oil before you sow them, which will encourage their vegetation, and render them so obnoxious to mice, that they will not eat them.

XVI. *Obesity of Geese.*—The celebrated *fat liver pies* of Strasburgh are made of the livers of geese, fattened with great attention. The animal is shut up in a cage, but little larger than its body, and is taken out but twice a-day, and then to be fed with about a quart of crude peas. They are introduced with a finger into the pharynx of the animal, which is thus made to swallow this enormous quantity of nourishment, and is then immediately shut up in its cage. The immediate result of this kind of life is a remarkable obesity, and an enormous development of the liver, which, without any notable change of structure, acquires a triple or quadruple enlargement of volume. Bibulous paper brought into close contact with this fat liver, immediately absorbs an oily matter, much like melted fat. These livers sometimes weigh eight or ten ounces, and sell at from three to five francs. The fattening of geese in this manner is a good speculation, for every part of the animal possesses an intrinsic value; the fat on many occasions is a substitute for butter, and the flesh is served at table, and, although somewhat tough, is not the less nutritious; the feathers are much sought after, the quills serve for writing, and even the excrements sell at a high price as one of the richest manures.—*Edinburgh New Philosophical Journal*, No. 26.

XVII. *Fondness of Poultry for Pepper.*—The Capsicum frutescens, which alone affords, when dried and powdered, the genuine Cayenne pepper, is commonly known in Jamaica by the name of bird-pepper, or hen-pepper, on account of its being so much eaten by birds, and especially by hens and turkeys, which will not leave a pod remaining on the bush, that is within their reach, by jumping up to them. They are so fond of these pods, as to eat a great

number of them at a time. These peppers are called *Chilies* in England. Even the Cayenne sold in Jamaica is prepared from several sorts of red capsicums, mixed with the C. frutescens; but they are all much inferior in pungency and fine aromatic flavour; and persons who would have it genuine are obliged to prepare it in their own families.—*Mag. Nat. Hist.*

XVIII. *Wine from Potatoes.*—M. Jacob, on an estate of his own at Forges, on the river Meuse, has occupied himself in endeavouring to make wine from potatoes, and, after many ingenious experiments, has at length obtained a liquor like Muscatel. He confidently anticipates producing other varieties of wine, and constituting a new and important article of commerce.—*The Universal Corn Reporter.*

XIX. *Uses of the Horns of Cattle.*—Amongst the causes which tend to the cheap production of any article, and which requires additional capital, may be mentioned the care which is taken to allow no part of the raw produce out of which it is formed to be wasted. An attention to this circumstance sometimes causes the union of two trades in one factory, which otherwise would naturally have been separated. An enumeration of the arts to which the horns of cattle are applicable, furnishes a striking example of this kind of economy. The tanner who has purchased the hides, separates the horns, and sells them to the makers of combs and lanterns. The horn consists of two parts; an outward horny case, and an inward-conical shaped substance, somewhat between hardened hair and bone. The first process consists in separating these two parts, by means of a blow against a block of wood. The horny outside is then cut into three portions by means of a frame-saw. 1*st*, The lowest of these, next the root of the horn, after undergoing several processes, by which it is rendered flat, is made into combs. 2*d*, The middle of the horn, after being flattened by heat, and its transparency improved by oil, is split into thin layers, and forms a substitute for glass in lanterns of the commonest kind. 3*d*, The tip of the horns is used by the makers of knife handles and the tops of whips, and similar purposes. 4*th*, The interior or cone of the horn is boiled down in water. A large quantity of fat rises to the surface: this is put aside, and sold to the makers of yellow soap. 5*th*, The liquid itself is used as a kind of glue, and is purchased by the cloth-dresser for stiffening. 6*th*, The bony substance which remains behind is ground down and sold to the farmers for manure. Besides these various purposes to which the different parts of the horn are applied, the chippings which arise in comb-making are sold to the farmer for manure at about one shilling per bushel. In the first year after they are spread over the soil, they have comparatively little effect; but during the next four or five, their efficiency is considerable. The shavings which form the refuse of the lantern-makers, are of a much thinner texture. A few of them are cut into various figures, and painted and used as toys, for they curl up when placed in the palm of a warm hand. But the greater part of these shavings are sold for manure, which, from their extremely thin and divided form, produce its full effect upon the first crop.—*Babbage on Manufactures.*

XX. *Domestic Yeast.*—Persons who are in the habit of making domestic bread, cake, &c. can easily manufacture their own yeast, by attending to the following directions: Boil one pound of good flour, a quarter of a pound of

brown sugar, and a little salt, in two gallons of water, for one hour. When milk-warm, bottle it and cork it close. It will be fit for use in 24 hours. One pint of the yeast will make 18 pounds of bread.

XXI. *On the Distance to which Spray of the Sea may be carried.*—The utmost distance to which sea-water is conveyed by tempestuous winds is not easily determined. Sir H. Davy, in his Elements of Agricultural Chemistry, p. 295, states, that "in great storms the spray of the sea has been carried more than fifty miles from the shore;" but he does not give his authority. Being at Blackwall, in Derbyshire, the residence of my relative John Blackwall, Esq. on the 23d of November 1814, when a violent hurricane occurred, which did extensive damage on the southern coast, I took several opportunities of examining the rain which fell at intervals on that occasion, and uniformly found that it became extremely turbid on application of the test, evidently containing much more muriatic acid than rain collected in large towns, during calm weather, is ever found to contain. The storm commenced on the night of the 22d of November, and continued, with little abatement, till after noon on the 23d. The wind blew from the south all the time, and the place of observation is 140 or 150 miles from the sea in that direction. This is perhaps the greatest distance on record to which sea-water has been clearly ascertained to be conveyed by the wind; and that it extended much further is highly probable.—*Manchester Memoirs*, vol. v. *New Series.*

XXII. *Giallo Antico.*—An important mineral treasure has, it is stated, been lately discovered in the Russian empire. It consists of rich quarries of reddish yellow marble, veined with white, equal to the giallo antico of Lacedæmonia. The site is about twenty wersts from Simperhopol, in Tauris.—*Repertory of Inventions*, No. 92.

XXIII. *Salt Mines of Saltzberg.*—I went with a very large party, consisting of almost all the strangers at Ischl, to visit the Saltzberg, the salt mountain, or rather mine, which was to be illuminated for the visitors. We set out at about one o'clock a long string of carriages, and after an hour's drive through a very pleasant valley, we arrived at the foot of the mountain which contains the mine. Here a number of miners were waiting with sedan-chairs for the ladies, many of whom, however, preferred walking up the mountain, and in about three quarters of an hour we arrived at the chief entrance of the mine. We were now to be attired, as is usual on entering the mines, in a long white mantle or frock, and a large wide broad-brim; the latter to hinder us knocking our brains out, and the former to keep our clothes clean. Here was confusion dire; this frock was too small, this too long; this lady had no brimmer, this gentleman could find no stick. I laid hold of the first frock and hat I met with, but up came a lady and begged I would exchange with her, as her frock was so long she could not walk in it, and mine so short that it did not reach to my knees. Dressing at length finished, the ladies were placed in their carriages, that is, two in each wheel-barrow, face to face, with a miner before to pull, who carried a lamp in his hand, and another to push behind; and between every two barrows went a miner, carrying a paper lantern. The gentlemen were of course on foot, with the exception of one or two gouty invalids. In this guise, with half-a-dozen miners going before carrying lamps, the whole train entered the passage, and in a few seconds lost

sight of day-light. After a long, wet, and, in spite of our many lamps, dark journey through this narrow and low passage, where my head was continually coming in contact with the roof, we came to the *rutsch* or slide, which leads down into the salt chamber. The *rutsch* is formed of the trunks of two large fir trees laid close together, rounded, and polished, and placed in an oblique direction at an angle of about forty-five degrees. A miner, with a lamp in one hand, places himself astride these trees, and holds with the other a cord, which is fixed to the rock on the sides. The person who wishes to descend, seats himself behind the miner, and holds him by the shoulders. The miner then lets the cord slip through his hands, and down they go like lightning into what seems an abyss of darkness: safe at the bottom, he gives a shout that the next couple may follow. When the slide is very long, as in the mine at Hallein near Saltzberg, the miner always sits upon a thick leather apron, and when alone makes no use of the cord, but rushes down with fearful speed into the salt-cave below. When we arrived at the slide, and the ladies had all got out of their barrows, after much discussion and many fears and doubts, they consented thus to descend, as the miners assured them it was more dangerous to do so by the steps cut in the sides of the rock, which were accordingly steep and very wet. Having reached the bottom of the slide, which ends in a slight curve to break the impetus of the descent, we found ourselves in an immense cavern or room, excavated in the rock about twelve feet high and from 10,000 to 12,000 in circumference, supported in the middle by a massive pillar of rock, and lighted up by some hundred lamps, which only served, however, to give the scene a more awful and gloomy appearance. The visitors, whose number was considerable, in their long white robes and hats, looked like spectres wandering in the shades of the nether world. The roof and walls of this cavern were covered with minute crystals of salt, not, however, sufficiently large to give it that glistering appearance which I had expected. The mountain contains a great many of these salt chambers, which, at different periods, are filled with fresh-water, conducted into them by wooden pipes. When they have dissolved a sufficient quantity of salt, which operation occupies some months, it is drained off through a deep perpendicular shaft, near the middle of the cave, and is then conducted through wooden pipes, often for a very great distance, to the boiling-houses, where it undergoes the process of evaporation. Having wandered through these gloomy abodes of silence and night for some time, we ascended the stairs, the ladies resumed their seats in the barrows, and the procession returned as it had entered. To save my head from additional thumps to the many it received on entering, I took the place of one of the pushers, and after a merry drive of about twenty minutes, we again saw day-light like a distant star, increasing in size till we reached the entrance to the mine. We here took off our spectre clothes, and returned home in our usual appearance, and a merry party we were.—*Tobin's Journal of a Tour through Styria, &c. in* 1828 *and* 1829.

XXIV. *Indian Coffee.*—In a communication from India to Dr Traill, it is stated that a Dr Strong has succeeded in raising a marketable coffee, in some quantity, at Russypugla, about five miles from Calcutta. The attempt failed in the hands of Dr Wallich, and those of Messrs Palmer and Company, who tried it on a large scale. The secret of Dr Strong's success is in cultivating

his plants *in the sun, not in the shade.* He states, when cultivated in the shade of other trees, as has been recommended by some, the roots and branches are more scanty than when they grow in the *full sun.* We expect, in our next number, to report as to the qualities of the coffee, from experiments made in this country. Dr Strong says, that if they can succeed in the formation of artesian wells, the cultivation may be extensively carried on in his neighbourhood, and with great prospect of its becoming a grand article of commerce. Should it equal, or be near in quality, to Mocha coffee, it will undoubtedly be of vast importance to Bengal.—*Edin. New Philosophical Journal,* No. 26.

XXV. *Peruvian Bark.*—Chemical science may, in many instances, be of great importance to the manufacturer, as well as to the merchant. The quantity of Peruvian bark which is imported into Europe is very considerable; but chemistry has recently proved that a very large portion of the bark itself is useless. The alkali quinia which has been extracted from it, possesses all the properties for which the bark is valuable; and only forty ounces of this substance, when in combination with sulphuric acid, can be extracted from 100 lb. of the bark. In this instance, then, with every ton of useful matter, thirty-nine tons of rubbish are transported across the Atlantic. At the present time, the greatest part of the sulphate of quinia used in this country is imported from France, where the low price of the alcohol, by which it is extracted from the bark, renders the process cheap; but it cannot be doubted, that when more settled forms of government shall have given security to capital and when advancing civilization shall have spread over the States of Southern America, the alkaline medicine will be extracted from the woody fibres by which its efficacy is almost lost, and that it will be exported in its most condensed form.—*Babbage on Machinery and Manufactures.*

XXVI. *The Chapel Oak of Allonville.*—Among ancient trees, there are few, I believe, at least in France, so worthy of attention as an oak which may be seen in the *Pay de Caux*, about a league from Yaetot, close to the church, and in the burial ground of Allonville. I had often heard it mentioned, but in a slight manner; and I am astonished, after having examined it, that so remarkable a tree should have remained so little known. This oak has sessile leaves, and acorns on footstalks, and is therefore of the true naval species. Above the roots it measures upwards of 35 English feet round, and at the height of a man 26 feet. A little higher up it extends to a greater size, and at 8 feet from the ground enormous branches spring from the sides, and spread outwards, so that they cover with their shade a vast extent. The height of the tree does not answer to its girth; the trunk from its root to its summit forms a complete cone; and the inside of this cone is hollow throughout the whole of its height. Several openings, the largest of which is below, afford access to this cavity. All the central parts having been long destroyed, it is only by the outer layers of the alburnum, and by the bark, that this venerable tree is supported; yet it is still full of vigour, adorned with abundance of leaves, and laden with acorns. Such is the oak of Allonville, considered in its state of nature. The hand of man, however, has endeavoured to impress upon it a character still more interesting, by adding a religious feeling to the respect which its age naturally inspires. The lower part of its hollow trunk has been transformed into a chapel, of 6 or 7 feet in diameter, carefully

wainscotted and paved, and an open iron gate guards the humble sanctuary. Above and close to the chapel is a small chamber, containing a bed; and leading to it there is a staircase, which twists round the body of the tree. At certain seasons of the year, divine service is performed in this chapel. The summit has been broken off many years, but there is a surface at the top of the trunk of the diameter of a very large tree, and from it rises a pointed roof, covered with slates, in the form of a steeple, which is surmounted with an iron cross, that raises itself, in a truly picturesque manner, from the middle of the leaves, like an antique hermitage, above the surrounding wood. The cracks which occur in various parts of the tree, are, like the fracture whence the steeple springs, closely covered with slate, which, by uplacing the bark, doubtless contribute to its preservation. Over the entrance to the chapel an inscription appears, which informs us that it was erected by the Abbé du Détroit, curate of Allonville, in the year 1696; and, over the door of the upper room is another, dedicating it "To our Lady of Peace." The oak is a tree which grows but slowly; in its youth, and to about forty years of age, it increases the most. After this period it becomes less rapid in its growth, and abates progressively. According to M. Bosc, an oak of 100 years' old is not commonly more than a foot in diameter. It is well known, however, from the spreading forth of the boughs, how much the growth depends upon the soil. If the calculation given by M. Bosc seems too small for the first century of the life of an oak, it becomes, on the contrary, too great if applied to the centuries which follow, on account of the gradual weakening vegetative powers, the natural effect of age. Following this clew, the oak of Allonville, giving in the middle portion of its trunk a diameter of more than 8 feet, must, according to this computation, be above 800 years of age, even supposing (which is by no means allowable) that it has continued increasing a foot in a century. Certainly this tree, the summit of which was majestically reared towards the clouds of old, and which has been contracted and shortened on every side, cannot for ages have grown in such proportion. One cannot but think that the increase has been scarcely perceived for the 125 years since it has been converted into a chapel by the happy thought of M. l'Abbé du Détroit. One must not, then, give to the tree of Allonville less than 800 or 900 summers. Perhaps in its youth it lent its shade to the companions of William the Conqueror, when they assembled to invade the British shore. Perhaps the Norman troubadour, on the return from the first Crusade, there often sang to his admiring countrymen the exploits of Godfrey and of Raymond. In England there are many oaks larger and loftier than this of Allonville, but none that are more interesting. In general there remain but very imperfect accounts as to the progress of growth and possible duration of trees. It is certain they are greater than is commonly supposed. The axe prevents almost always their natural death; and the situation alone of the oak of Allonville, near the Church, and in the burial ground, has probably rescued it from the common fate. In the present day, especially, the slightest whim of the owners fells an ancient tree, reverenced by his forefathers during many centuries; an instant destroys that which pitiless time had spared for ages; that which so long a lapse of time can alone replace. Happily the situation of the oak of Allonville, its consecration, and the reverence

of the villagers, appear to ensure its peaceable existence until it naturally yields to the destiny which is common to all things that live. At the deplorable period when every thing belonging to religion was condemned, the revolutionists, having come to Allonville to burn the oak, were vigorously opposed by the country people, and the sanctuary was preserved. As a monument at once of nature, of art, and of piety, the chapel-oak merits, on all hands, from naturalists that kind of pilgrimage which I have lately made, and which has given rise to this short memoir.—*Translated and abridged in the Saturday Magazine, from the Original Memoirs by Professor Marquis, of the Botanic Garden, Rouen.*

XXVII. *On the Custom of planting Yew-trees in Churchyards.*—The original design of planting yew-trees in churchyards has given rise to much antiquarian discussion. They are said to have been originally planted either to protect the church from storms, or to furnish the parishioners with bows. The statute of Edward I., which settles the property of trees in churchyards, recites that they are often planted to defend the church from high winds, and the clergy were requested to cut them down for the repairs of the chancel of the church whenever required. Several ancient laws were enacted for the encouragement of archery, which regulate many particulars as to bows; but it does not appear that any statute directed the cultivation of the yew. Although the scarcity of bow-staves is a very frequent subject of complaint in our ancient laws, yet instead of ordering the yew tree to be cultivated at home, foreign merchants were obliged, under heavy penalties, to import the material from abroad. In the 12th of Edward IV. it was enacted, that every merchant stranger should bring four bow-staves for every ton of merchandise imported from Venice or other places, from whence they had heretofore been procured. In the reign of Elizabeth, the complaint of the dearness and scarcity of bow-staves was renewed; and the statute of 6th Edward IV. was put in force. From the above particulars, it clearly appears that we depended upon foreign wood for our bows, which would not have occurred if our churchyards could have furnished a sufficient quantity for the public service. The truth is, that, though our archers were the glory of the nation, and the terror of its enemies, yet the English yew was of inferior quality, and our brave countrymen were obliged to have recourse to foreign materials. This accounts for the silence of our ancient legislators with respect to the culture of the English yew, which appears never to have been an object of national concern. Sir Thomas Brown, in his "Urn-burial," thinks it may admit of conjecture whether the planting of yews in churchyards had not its origin from ancient funeral rites, or as an emblem of the resurrection, from its perpetual verdure. The yew-tree has been considered as an emblem of mourning from the earliest times. The Greeks adopted the idea from the Egyptians, the Romans from the Greeks, and the Britons from the Romans. From long habits of association, the yew acquired a sacred character, and therefore was considered as the best and most appropriate ornament of consecrated ground. The custom of placing them singly is equally ancient. Statius in his *Thebiad* calls it the *solitary* yew. And it was at one time as common in the churchyards of Italy as it is now in North and South Wales. In many villages in those two provinces, the yew-

tree and the church are coeval with each other.—*Faulkener's Histories of Fulham and Kensington.*

XXVIII. *Tincture of Roses.*—Take the petals of the common rose (centifoliæ); place them, without pressing them, in a bottle; pour some good spirits of wine upon them; close the bottle and let it stand until it is required for use. This will keep for years, and yield a perfume little inferior to Otto of roses; a few drops will suffice to impregnate the atmosphere of a room with a delicious odour. Common vinegar is greatly improved by a very small quantity being added to it.—*Hort. Reg.* No. 16.

XXIX. *The Peach and Nectarine Trees distinguished by their Germens.*—Mr John Mitchell, gardener, Slapton, Devonshire, has discovered a method of distinguishing peach and nectarine trees at an early stage of their growth, when both first produce blossoms; to effect this, he dissects a few of the flowers of the trees about which he is doubtful; and that which produces a villous germen always proves a peach-tree, whilst those producing germens smooth and shining always proves a nectarine-tree.—*Gard. Mag.*

XXX. *Misseltoe.*—Mr Doveston succeeded in getting the misseltoe to vegetate on twenty-three sorts of trees; but on most of them it soon died, particularly on the gummy and the resinous, and only throve well on its usual habitats, the apple and hawthorn. He states that he never saw it growing well and luxuriantly upon the oak but once, and that at Anglesea, and singularly enough, hanging almost over a grand druidical cromlech. The misseltoe can only be propagated by seed; these are borne one in a berry, and when ripe, at Christmas time, may, by the tenacious gum which envelopes them, be readily fixed into the chinks of the bark of congenial trees.—*Mag. Nat. Hist.*

XXXI. *The Fraxinella.*—It is well known that when the fraxinella is approached at night with a candle, it dashes forth little flashes of light. This has been usually attributed to the existence of an etherial vapour, which surrounds this plant at the time of its flowering. M. Biot has shown the fallacy of such an opinion, and has proved that the phenomenon is the result of essential and inflammable oil, contained in small vessels at the extremities of the branches, which vessels burst on the approach of any inflamed body, setting at liberty the essential oil, as that contained in orange-peel is set at liberty by pressure.—*Repertory of Inventions*, No. 92.

XXXII. *The Scottish Thistle.*—This ancient emblem of Scottish pugnacity, with its motto *Nemo me impune lacesset*, is represented of various species in royal bearings, coins, and coats of armour, so that there is some difficulty in saying which is the genuine original thistle. The original of the national badge itself is thus handed down by tradition:—When the Danes invaded Scotland, it was deemed unwarlike to attack an enemy in the pitch darkness of night, instead of a pitched battle by day; but, on one occasion the invaders resolved to avail themselves of this stratagem, and in order to prevent their tramp from being heard, they marched barefooted. They had thus neared the Scottish force unobserved, when a Dane unluckily stepped with his naked foot upon a superbly pricked thistle, and instinctively uttered a cry of pain, which discovered the assault to the Scots, who ran to their arms, and defeated

the foe with a terrible slaughter. The thistle was immediately adopted as the insignia of Scotland.—*Literary Gazette.*

XXXIII. *Wild Cotton-Tree.*—The Mahor or wild cotton-tree grows in Cuba to a vast size: there is one on an estate called Santa Anna 100 feet high. Its trunk, which is 44½ feet in circumference at the base, rises to 65 feet without a branch or a single knot on its white bark. The branches are worthy of the stem, and cover a diameter of 165 feet. This immense tree is in itself a world, and shelters and feeds millions of insects; several parasitical plants attach themselves to it: wild pine-apples grow at the top, and the vine vegetates on its boughs, and letting its branches droop to the earth, furnishes a ladder for rats, mice, and opossums, which would find it difficult to climb up a smooth bark, and enable them to reach the pine cups, which form so many natural reservoirs for the rain water. The wood-louse founds extensive republics in this tree, and establishes its large and black cities at the juncture of some of the branches, from whence it descends to the ground by a covered way of which it provides two, one to ascend, and the other to descend. This little insect is of the size of a flea, is inoffensive, and a great treat to the inhabitants of the poultry-yard when given to them in the nest altogether.—*Hort. Reg.* No. 16.

XXXIV. *Bats.*—Bats of the ordinary size, are very numerous in Jamaica; they are found in mills and old houses, especially such as are little occupied; they do great mischief in gardens, where they eat the green peas, opening the pod over each pea, and removing it very dexterously. Bishop Heber says, "the vampire bat of India is a very harmless creature, of habits entirely different from the formidable idea entertained of it in England. It only eats fruit and vegetables, and indeed its teeth are not indicative of carnivorous habits; and from blood it turns away when offered to it. During the day time, it is, of course, inert; but at night it is lively, affectionate, and playful, knows its keeper, but has no objection to the approach and touch of others." Mr Waterton, however, when speaking in the "Wanderings" of the vampire of South America says, "there are two species in Demerara, both of which suck living animals; one is rather larger than the common bat, the other measures above two feet from wing to wing extended. So gently does this nocturnal surgeon draw the blood, that instead of being roused, the patient is lulled into a still profound sleep." The larger vampire sucks men and other animals; the smaller seems to confine itself chiefly to birds.—*Mag. Nat. Hist.*

XXXV. *Serpents.*—M Duvernoy, who has devoted much time to the study of the organization of venomous serpents, has ascertained that, besides the venomous teeth in front, the existence of which has long been known, they have in the hinder part of the jaw longer and stronger teeth, of as great malignity. He is also inclined to think, that the secretions of the lachrymal glands in some descriptions of venomous serpents, do not go to moisten the eye-balls, but enter the mouth, and assist in communicating saliva to the food.—*Hort. Reg. No.* 16.

XXXVI. *Teal.*—During the months of November, December, January, and February, the climate of Jamaica is rendered delightfully cool, by the blowing of the north-west wind, which passes over the continent of the North

America, and, except an occasional light shower, the sky is always bright with constant sunshine; so that at an elevation of one thousand eight hundred feet above the level of the sea, the thermometer ranges in the morning from 56 to 60 degrees, and at noon from 70 to 75 degrees. Through the above-named period, the island is visited by vast flocks of Teal, supposed to be the same species named by Gmelin, the Carolinensis or American Teal. They make their way to ponds, and up the courses of rivers; and are shot in great numbers. This bird is most delicious eating. It is considered to come from the southern states of North America. It is thought some remain in Jamaica all the year, breeding in swamps and lagoons near the sea.—*Mag. Nat. Hist.*

XXXVII. *The Nightingale.*—At Goldalming in Surry, on the 12th of December, (either 1823 or 1824,) Mr E. Newman of Deptford, heard the nightingale singing clearly and distinctly, although not very loudly; he had a companion with him at the time, a close observer of birds, who has several times since borne testimony to this remarkable fact. In the same neighbourhood, the nightingale has been frequently seen in the month of October, and once in November.—*Mag. Nat. Hist.*

XXXVIII. *Instinct of Wild Ducks.*—Being engaged in improving the grounds at Hedgerley Park, Buckinghamshire, during the last winter, I was desirous that the labourers should be kept employed in frosty weather, and therefore took the opportunity of collecting a quantity of large roots and stumps of trees which had been grubbed up at various times in the woods and hedgerows; these were dragged over the ice to an island in the centre of the lake, for the purpose of forming picturesque towers, and ruins. During this process, I was much amused by the movements of a great number of wild ducks on the opposite side of the lake; when about fifteen or twenty of these aquatic birds were constantly swimming, diving, and violently agitating the water, so as to prevent its becoming congealed by the frost: this they effectually prevented, although the ice on the other parts of the lake was sufficiently strong to bear not only the weight of the large stumps of trees, but also that of ten or twelve men, whose labours were necessary to drag them to the island. When these ducks became weary and retired from the water, they were regularly relieved by about the same number of others, which had been nestling amongst the rushes on the bank, and these again after a certain time, relinquished their labours to another party, so that the water was kept in a constant state of agitation both night and day, until the frost was over. I observed, that whenever the fresh party of ducks entered the water, their first object was to swim close to the ice in a semi-circle form, so as to entirely prevent it congealing any where within their boundaries; but what struck me as the most extraordinary circumstance was, that when the well known whistle of the keeper proclaimed the feeding-time, it had no effect on the ducks then on duty, although all the others flew as usual to the spot with their accustomed clamour; a part, however, soon returned to the lake with a loud call for those then in the water to change situations, which was performed with an alacrity and regularity, that would have been a lesson to well disciplined troops. The ducks appeared nearly regardless of the labourers, although at other times a single footstep would have alarmed the whole flock, and put them to flight. —*Mr Henry Phillips, in a Letter in the Hort. Reg.* No. 16.

XXXIX. *Mackerel burying themselves in the Mud.*—Admiral Pleville-Lepley, who had his home on the ocean for half a century, assured M. Lacepede that at Greenland, in the smaller bays surrounded with rock, so common on this coast, where the water is always calm, and the bottom generally soft mud and fuci, he had seen in the beginning of spring myriads of mackerel with their heads sunk some inches in the mud, their tails elevated vertically above its level; and that this mass of fish was such, that at a distance it might be taken for a reef of rocks. The Admiral supposed that the mackerel had passed the winter torpid under the ice and snow; and added, that for fifteen or twenty days after their revival, these fishes were affected with a kind of blindness, and that then many were taken with the net; but as they recovered their sight, the net would not answer, and hooks and lines were used.—*Edin. Journ. of Science.*

XL. *Mode of Fishing in China.*—Among the many amusing scenes which strike the eye of a European on his first visit to China, is the ingenious mode of fishing which he sees practised in the neighbourhood of Canton. At the stern of their little punt-like boats, a small mast like a flag-staff, about eight feet high, is fixed. To the top of this a block is made fast, having a sheave to carry a one and a half inch rope. One end of this rope is fixed to a bamboo pole, twelve or fifteen feet in length, and which is hoisted higher or lower, according as it is wanted. The butt end of the pole is kept inboard; and at the other end a light net, about eight feet square, is slung; being kept distended by two slender rods, fixed diagonally to the opposite corners, and bound together in the middle, where they cross each other; and where also they are fixed to the end of the swinging-pole. A stone is thrown into the middle of the net, to assist it in sinking, so that it may be, when down, spread out on the bottom of the river. When the fisherman thinks any fish are passing over the net, he suddenly hoists it above the water; and if he has made a capture, he swings the net inboard to take out the fish; if none are caught, the net is dropped again in the same or some other place.—*Mag. Nat. Hist.*

QUARTERLY AGRICULTURAL REPORT.

Now that the last crop has become the object of barter, it has been fully ascertained to be a bulky crop in every respect, though its quality is not so uniformly regular as its quantity. The unsettled state of the weather throughout Great Britain and Ireland, in the earlier period of the harvest, had unfortunately damaged the colour of barley, and even sprouted a great proportion of it. The practice too generally followed in England of permitting barley to remain for days on the ground in the swathe after it is cut down, has proved a bad one this season; and, in consequence, most of the early English barley is in an unfit state for malting. In Scotland, the barley is bound up in sheaves as it is cut down; and, though the rain certainly discoloured it in the stook, there

is not much of it sprouted. The wheat being bound in sheaves in England, escaped, in a great degree, the injury of sprouting. From the middle to the termination of harvest, the weather was very propitious, and the remainder of the crop was housed in good order.

The wheat is bulky in straw, and productive in grain, and it is generally of good quality. Its weight runs from 60 lb. to 63 lb. per imperial bushel.

The barley is the most bulky crop of any this season. But for the adverse weather at the commencement of the harvest, it would have proved, in respect of colour, and weight, and prolificacy, the finest crop for many years past, perhaps since the year 1822. It weighs as it is from 51 lb. to 53 lb. per bushel, on an average, some of it being so low as 50 lb. and other samples as high as 56 lb.

The oats improved towards the end of harvest, and are a better crop, both in point of straw and grain, than was at one time expected. The colour is not generally fine, but a considerable proportion has proved well as to the mealing quality. The weight of potato oats runs from 41 lb. to 44 lb. per bushel; the common from 39 lb. to 42 lb.

Both peas and beans are bulky. The former are more productive than the latter.

Turnips improved very much throughout the whole kingdom during the fine warm weather in September. Potatoes are a very unequal crop, those upon strong lands proving deficient. Upon light lands, they are both productive and of good quality.

The prices of grain in the home markets have experienced a great depression since the end of harvest, the wheat in the Edinburgh market declining 20s. a quarter. A fall of price was to be expected as a consequence of an abundant harvest; but the present very low depression arises, we think, from a circumstance which will be obviated in a short time. Most of the early barley was much discoloured or sprouted. It is very natural for the farmer to get quit of this kind of grain as soon as possible; and, as many of them are unfortunately under the necessity of disposing of a part of the crop to pay the expenses attending on the harvesting of it, a considerable quantity of the grain was brought immediately into the market. But the fine barley will yet be in demand for malting, and then the prices will recover from the present depression.

There has been an extraordinary activity among the foreign grain this quarter. The fear of low prices in the British markets, consequent on the abundant crop, induced the holders of foreign grain in bond, to withdraw their stocks and pay the duty, which rises as the weekly aver-

age price falls. The quantity of foreign grain thus released from bond, during the quarter, and particularly towards the latter period of it, amounts to 257,553 quarters 2 bushels of all kinds of grain, and 105,941 cwt. 3 quarters and 12 lb. of flour and meal. The amount of duty paid on grain, that on wheat varying from 23s. 8d. to 32s. 8d. per quarter, was L. 230,264. The imports of foreign grain have been very limited, being only 230,428 quarters 6 bushels of all kinds of grain; while the quantity still remaining in bond amounted, on 1st October, to 914,125 quarters 5 bushels of grain, and 605,176 cwt. and 26 lb. of flour and meal.

We understand that some maltsters prefer buying foreign barley to our own. It can be shipped free on board for 16s. per quarter, and the high duty of 15s. 4d. does not deter speculators from offering it in our markets.

There has been an amazing briskness in our cattle markets this autumn. The abundance of fodder every where has caused a short supply of cattle in the markets; and the great improvement in the turnip crop in England has created an unexpected demand for them from the south. The consequence has been a rise of price in every succeeding market. At Doune and Hallow Fairs cattle were L. 1 and sheep 5s. a-head above the Falkirk prices.

Every one seems impressed with the conviction that an attempt at least will be made to alter the present corn laws. Not to make a mere modification of them, but to change the principle of them, by abolishing the average system and fluctuating duty, and substituting a fixed duty. We shall reserve our observations on these proposed changes till a more fitting opportunity. The subject is highly interesting, inasmuch as it involves a great change. In the mean time, we observe the farmers of Buckinghamshire have had several meetings to express their preference of the present system to one of a fixed duty.

Upon the whole, we see no cause for despondency to the agricultural interest of the kingdom. Contemplated great changes cannot be effected without much previous discussion; and a low price must always be a concomitant of a great crop. An increase in the number of quarters to be disposed of will compensate for a fall in the price; and no lover of his country should for a moment forget, that a great crop is a great blessing to every individual in the community.

The Revenue exhibits an improvement of L. 696,847 on the corresponding quarter of last year. Of this increase, one-third has been derived from duties paid on the import of foreign grain. The decrease on the year still amounts to L. 327,576.

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold in the following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug. 3.	64 4	32 8	21 5	36 7	38 3	37 11
10.	64 7	32 1	21 9	35 4	37 1	37 2
17.	63 0	34 0	21 9	41 3	37 3	36 7
24.	61 1	32 10	21 2	42 5	38 7	36 7
31.	60 6	29 5	20 1	42 7	40 10	36 2
Sept. 7.	58 0	30 9	20 5	34 9	39 6	36 0
14.	57 6	35 11	20 5	35 6	42 6	36 3
21.	58 6	36 9	20 1	34 6	42 2	36 4
28.	57 11	36 1	20 5	34 9	43 2	36 8
Oct. 5.	56 6	34 5	19 10	32 11	42 4	36 1
12.	54 1	31 0	19 10	33 9	42 1	35 3
19.	51 11	30 8	19 7	33 1	39 10	33 11
26.	54 10	28 4	19 11	32 6	39 10	34 6

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.
1832.	s. d.	s. d.	s. d.	s. d.
Aug. 3.	34 5	21 0	16 6	10 4
10.	33 10	19 6	15 9	10 4
17.	30 0	18 0	14 6	10 6
24.	28 6	16 0	12 5	10 0
31.	28 0	14 6	12 6	10 0
Sept. 7.	27 2	14 6	12 3	9 6
14.	26 6	14 0	12 6	9 4
21.	24 6	13 7	12 8	9 1
28.	23 6	13 6	12 6	9 0
Oct. 5.	22 5	13 1	12 0	8 6
12.	23 3	12 8	11 0	8 3
19.	23 6	12 11	11 6	8 6
26.	24 0	13 2	12 0	9 0

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug. 7.	58 8	28 5	18 2	36 2	39 8	39 6
14.	58 11	29 9	18 9	37 6	39 6	39 6
21.	60 2	30 6	19 3	38 0	38 6	39 4
28.	59 10	28 0	18 8	38 6	38 0	39 10
Sept. 4.	56 4	26 10	17 4	39 2	39 0	38 6
11.	57 4	26 6	16 10	38 8	39 6	38 6
18.	55 5	26 5	17 4	36 6	40 6	36 10
25.	54 3	26 10	17 6	34 6	41 0	37 8
Oct. 2.	50 11	29 6	17 2	34 4	41 8	39 2
9.	48 9	34 3	17 1	32 6	40 10	39 2
16.	46 6	30 10	16 6	32 2	40 0	38 11
23.	47 9	29 6	17 0	32 0	38 6	37 9
30.	48 6	31 6	16 6	32 0	38 10	38 6

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.
1832.	s. d.	s. d.	s. d.	s. d.
Aug. 8.	73 1½	36 6	23 2½	32 10
15.	71 4½	36 3	24 9	31 10
22.	72 6½	37 0	25 2	33 0
29.	70 9	32 1	24 0	32 7
Sept. 5.	67 4	33 1½	24 6	32 0
12.	60 6	31 0	24 7	33 0
19.	51 4	31 8	22 9	33 0
26.	50 7	31 6	21 8	32 0
Oct. 3.	53 8	29 10	21 9	33 0
10.	52 5½	28 6	21 2	31 1
17.	52 2½	29 0	19 8	33 0
24.	55 8½	30 1	19 9	32 2
31.	53 2	29 9½	20 4½	30 6

TABLE shewing the Weekly Average Prices of GRAIN, made up in terms of 7t Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FC CORN ; the Duties payable thereon, from 1st August to 1st November 1832.

Date.	Wheat.			Barley.			Oats.			Rye.			Pease.			
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug. 3.	63 5	63 4	23 8	32 10	33 0	12 4	20 8	21 2	15 3	36 0	36 2	15 6	38 1	37 1	14 0	36 7
10.	63 2	63 5	23 8	33 1	33 0	12 4	21 2	21 2	15 3	36 7½	36 5	15 6	39 1	37 11	14 0	36 7
17.	63 2	63 5	23 8	33 3	33 1	12 4	21 2	21 2	15 3	36 1½	36 4	15 6	37 2	38 0	12 6	37 6
24.	62 0	63 2	23 8	33 1	33 1	12 4	20 11	21 1	15 3	36 10	36 6	15 6	35 1	37 9	14 0	36 5
31.	59 7	62 6	24 8	32 0	32 11	13 10	20 1	20 11	16 9	36 7	36 8	15 6	38 2	37 10	14 0	36 8
Sept. 7.	58 0	61 7	25 8	34 3	33 1	12 4	19 4	20 6	16 9	33 0	35 10	16 9	38 10	37 9	14 0	35 11
14.	58 0	60 8	26 8	34 2	33 3	12 4	19 9	20 5	15 9	33 11	35 6	16 9	38 1	37 9	14 0	36 5
21.	57 9	59 9	27 8	34 2	33 6	12 4	19 9	20 2	16 9	35 2	35 3	16 9	40 4	37 11	14 0	37 3
28.	56 6	58 8	28 8	33 10	33 7	12 4	19 3	19 10	16 9	34 2	34 11	18 3	39 9	38 5	12 6	37 1
Oct. 5.	54 6	57 5	29 8	32 6	33 5	12 4	18 11	19 6	16 9	34 2	34 6	18 3	40 4	39 3	11 0	36 10
12.	52 4	56 2	30 8	30 3	33 1	12 4	18 11	19 4	16 9	32 11	33 11	19 9	39 4	39 6	11 0	35 7
19.	51 3	55 1	31 8	29 6	32 4	13 10	18 10	19 3	16 9	33 1	33 11	19 9	39 6	39 7	11 0	34 11
26.	52 6	54 2	32 8	29 3	31 6	15 4	18 5	19 0	18 3	32 11	33 9	19 9	38 1	39 7	11 0	35 1

MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantit upon which duties have been paid for home-consumption, during the same Month; and Quantities remaining in Warehouse at the close thereof: from 1st August to 1st October 1832.

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE		
832. month ding	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total
	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs.
g. 1.	30,234 3	26,526 7	56,751 2	2,766 3	28,363 3	31,129 6	637,109 4	59,812 3	696,921
ept. .	4,213 6	..	4,213 6	1,525 7	..	1,525 7	23,053 1	..	23,053
t . .	5,351 5	577 3	5,929 0	28 7	577 3	606 2	281,083 0	..	281,083
v . .	1,070 6	..	1,070 6	..	..	..	3,429 3	..	3,429
n . .	716 3	..	716 3	0 4	..	0 4	3,008 3	..	3,008
c . .	646 2	..	646 2	25 5	..	25 5	24,799 6	..	24,799
otals, .	42,223 1	27,104 2	69,327 3	4,347 2	28,940 6	33,288 0	972,483 1	59,812 3	1,032,29
pt. 1.	49,267 0	34,754 2	84,741 2	56,896 1	31,836 6	88,732 7	610,752 4	58,166 7	668,919
ept. .	7,280 3	193 4	7,473 7	6,741 2	96 6	6,838 0	23,572 2	..	23,572
t . .	3,419 7	75 7	3,495 6	..	75 7	75 7	281,023 5	..	281,023
v . .	1,740 5	..	1,740 5	6 3	..	6 3	5,163 5	..	5,163
n . .	170 2	..	170 2	383 6	..	383 6	2,786 7	..	2,786
c . .	2,494 1	..	2,494 1	52 0	..	52 0	27,171 7	..	27,171
otals, .	65,022 2	35,023 5	100,045 7	64,079 4	32,009 3	96,088 7	950,470 6	58,166 7	1,008,637
t. 1.	33,577 6	13,431 0	47,008 6	101,851 6	22,140 1	123,991 7	527,162 5	48,135 0	575,297
ept. .	1,131 1	..	1,131 1	3,899 4	..	3,899 4	20,810 7	..	20,810
v . .	9,318 4	..	9,318 4	65 1	..	65 1	282,121 5	..	282,121
n . .	1,813 1	..	1,813 1	..	..	..	5,008 2	..	5,008
c . .	902 6	..	902 6	1 5	..	1 5	3,634 6	..	3,634
. .	431 2	..	431 2	..	..	..	27,252 4	..	27,252
otals, .	47,174 4	13,431 0	60,605 4	106,036 2	22,140 1	128,176 3	865,990 5	48,135 0	914,12

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE		
832. month ding	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total
	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. q
r, . .	13,433 2 21	14,612 3 8	28,046 2 1	1,552 1 16	13,674 0 5	15,226 1 21	635,696 0 21	20,590 1 8	656,216
nal, .	..	..	..	..	56 1 26	56 1 26	..	82 2 11	82
otals, .	13,433 2 21	14,612 3 8	28,046 2 1	1,552 1 16	13,730 2 3	15,282 3 19	635,696 0 21	20,672 3 19	656,299
pt. 1.	11,344 0 17	22,022 2 0	33,366 2 17	22,959 2 3	18,503 3 8	41,454 1 11	612,911 3 0	21,327 2 6	635,239
nal, .	..	51 0 6	51 0 6	..	51 0 6	51 0 6	..	82 2 11	82
otals, .	11,344 0 17	22,073 2 6	33,417 2 23	22,959 2 3	18,554 3 14	41,505 1 17	613,911 3 0	21,410 0 17	635,321
2. 1.	974 1 4	20,612 3 24	21,587 1 0	30,461 3 7	18,691 1 25	49,153 1 4	582,033 1 13	23,052 3 10	605,086
r, . .	61 1 12	..	61 1 12	..	..	..	7 1 20	82 2 11	90
otals, .	1,035 2 16	20,612 3 24	21,648 2 12	30,461 3 7	18,691 1 25	49,153 1 4	582,040 3 5	23,135 1 21	605,176

PRICES of BUTCHER-MEAT.

Date.	Smithfield, *Per Stone of* 14 lb.		Morpeth, *Per Stone of* 14 lb.		Edinburgh, *Per Stone of* 14 lb.		Glasgow, *Per Stone of* 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
Aug.	5/3 @ 7/	6/3 @ 7/3	5/3 @ 6/6	6/3 @ 7/6	6/ @ 7/	6/ @ 7/	6/3 @ 7/3	6/9 @ 8/
Sept.	5/6 7/3	6/ 7/	5/3 6/6	6/6 7/9	6/3 7/6	6/ 7/3	6/6 7/6	6/6 7/6
Oct.	5/9 7/6	6/6 7/9	5/9 7/	6/6 8/	6/6 7/9	6/6 7/6	6/9 7/9	6/6 7/9

PRICES of English and Scotch WOOL.

English, per 16 lb.—*Merino*, Washed, 21/ @ 25/; in Grease, 14/6 @ 18/.—*South Down*, 14/ @ 21/; *Leicester*, Hog, 15/ @ 18/; Ewe and Hog, 14/ @ 16/6.—Ewes, 13/6 @ 14/6.—*Locks*, 9/6 @ 10/; *Moor*, Ewe and Hog, 6/ @ 7/3.

Scotch, per 24 lb.—*Leicester*, 26/ @ 28/; Ewe and Hog, 22/6 @ 25/.—Ewe, 20/ @ 24/.—*Cheviot*, White, 22/6 @ 24/; Washed, 16/ @ 18/; Laid, 14/ @ 14/6.—*Moor*, White, 9/6 @ 10/9; Laid, 8/ @ 8/6.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of October 1831, *and 5th of October* 1832, *showing the Increase and Decrease on each head thereof.*

	Quarters ended October 10.		Increase.	Decrease.	Years ended October 10.		Increase.	Decrease.
	1831.	1832.			1831.	1832.		
	£	£	£	£	£	£	£	£
Customs, . .	4,339,741	4,696,129	356,388	. .	15,577,687	15,201,299	. .	376,388
Excise, ...	4,370,597	4,668,188	297,591	. .	14,896,521	14,956,307	59,786	. .
Stamps, . . .	1,681,745	1,657,759	. .	23,986	6,484,580	6,528,843	44,263	. .
Post-Office,	366,000	333,000	. .	33,000	1,393,011	1,313,000	. .	80,011
Taxes, ...	540,576	656,959	116,383	. .	4,945,110	5,022,324	77,214	. .
Miscellaneous,	98,080	81,551	. .	16,529	439,479	387,039	. .	52,440
	11,396,739	12,093,586	770,362	73,515	43,736,388	43,408,812	181,263	508,839
	Deduct Decrease, . .		73,515		Deduct Increase, .		. .	181,263
	Increase on the quarter,		696,847		Decrease on the year,		. .	327,576

FOREIGN CORN MARKETS.

The general result of the inquiries into the state of the last crop on the Continent is, that it has been an abundant one; but that it presents various degrees of quality in the grain,—a character very similar to that of our own crop. Wet weather had injured the grain cut in the early part of the harvest; and, in consequence, much of the wheat has been housed in a damp state, and a proportion of the barley has been sprouted. Some of the oats, peas, and beans, have been housed also in bad condition. The rye, on the other hand, is universally well housed; it is of a fine quality, good colour, heavy and dry. Potatoes are an abundant crop. The following are the advices and quotations from some of the principal foreign ports:—

HAMBURGH.—Some demand for wheat from Holland, and a little supply, keep the markets steady, and our quotations are paid. Fine upland barley sells at the prices noted readily. Rye not inquired for. Oats have advanced from 2/ to 4/, in consequence of purchases for Holland and Belgium. Wheat, best and good upland, new 31/6 to 33/4; best Mecklenburgh, new 32/1 to 33/; Anhault, white 31/6 to 36/8; red 31/6 to 33/4. Barley, upland malting, new 22/1 to 22/8. Oats, best upland Holstein feed, old 12/1 to 12/4; new 8/11 to 10/9. Rapeseed cake, £4, 1/ to £4, 6/; oil-cakes, 10/ per ton. Freight to London, 1/6 to 1/9; to Leith, 1/6 to 2/ per quarter.

DANTZIG.—In giving a general view of the harvest in the interior and in Poland, we may say that it has turned out abundantly, but rather indifferent as to quality. A great proportion suffered by the wet weather in the beginning when the crops were gathered, and before they could be housed. Whatever has been doing here for the last two months has been for the islands of Guernsey, Jersey, Mann, and for Holland. Just now, whilst these small shipments are making for these ports, the following prices are paid: Best high mixed wheat, 35/ to 36/; good, 33/ to 34/; good and red mixed, 27/ to 30/. As yet we have had no supplies of new wheat coming down the river, but continue to receive shipments of old wheat from Poland, so that our stocks are now increased to 10,000 lasts, being warehoused on account of the owners. We are amply supplied by land carriage for the consumption, and indeed the stock is daily increasing. For barley at 17/ we have some small foreign orders. It is highly probable our corn prices will farther decline some time hence, when, perhaps, wheat may be worthy the attention of speculators.

LIEBAU.—Our transactions in grain and seeds during the past season have been extensive, and we have shipped up to the present time 230 lasts of wheat, 7300 lasts of rye, 7000 lasts of barley, 160 lasts of oats, 36,000 barrels of linseed, and 6300 barrels of hemp-seed. The harvest, owing to the rainy and inclement weather, has been much retarded, and the quality of all the grain has been more or less damaged, and we shall no doubt have a great deal of an inferior description, and the produce will be below an average. As the duty on hemp-seed has been considerably lowered in England, we anticipate a demand for it. Our quotations are as follows: Wheat, 34/ to 36/; rye, 23/ to 23/6; barley, 17/ to 18/; oats, 9/ to 18/.

ROSTOCK.—Wheat is a very good crop, as well in respect to quantity as to quality, weighing on the average full 60 lb. per bushel. Compared with last year, the corn is not so bright in colour, but has rather a brownish tinge; but we still think that the grain will be preferred, on account of its thorough soundness and dryness, which will make it a very fit article for speculative purchases. Barley is not more than a fair average crop, and the quality is not so good as last year, being of brownish colour, and the weight hardly more than 51 lb. per bushel. Oats are less than an average crop, having suffered much from the drought during sowing, which left them thin in the ground, and small in the straw, and yielded but a small quantity. It is, however, a stout grain, although the colour generally might be better, and we

expect an average weight of 37 lb. per bushel. Since about ten days, we have begun to receive supplies from the country; but they are not so large as might have been expected, as our opulent farmers will not sell as yet at the present low prices. We have bought some really fine wheat at 25/ to 25/6; good barley at 16/; oats at 11/; all free on board. Wheat and barley go off very readily at these prices, being wanted for shipment to Holland. We should think these low rates are worth attention, and that the same may induce some speculative purchases to be made. Freights are at present high, as usual in the autumn, say 6/ or 7/ per quarter for wheat to the east coast of Great Britain; but, in the spring, no doubt, plenty of ships may be had at 4/ per quarter in full.

LUBECK.—From England there appears little probability of any foreign demand being experienced this season. With Holland, however, and Belgium some business in wheat and barley is likely to be transacted. The inquiry for the latter article is brisk, weighing 51½ lb. per bushel, and a good many Dutch orders have been received at 17/, and a few cargoes have been shipped at these rates, and prices are at present not likely to give way.

WISMAR.—Of wheat, the crop in this neighbourhood may be called very abundant, and probably more so than it has been for the last few years; the quality, however, we do not feel justified to call fine, as the colour of several parcels which we have seen is rather bad: besides this, there exists a great variety in the weight, which we may state from 56 lb. to 60 lb. per imperial bushel. Of rye we have had a great crop, and the quality is particularly fine; the weight will be at least 56 lb. per bushel. Of peas the quantity as well as the quality is satisfactory. The barley crop likewise gives satisfaction with respect to quantity; the quality, however, is, generally speaking, by no means fine, owing to the rain which set in during harvest, and which has done some injury to the colour. We do not consider our new growths as fit for English maltsters; the average weight is from 49 lb. to 50 lb. per bushel. Oats are the only article of which the crop here turns out to be bad this year, the produce being small, and the quality very meddling. We have not seen samples enough to form an idea about the weight. For wheat there is at present some demand, at prices equal to about 26/ free on board, in order to fill up some small cargoes for Holland; and barley for the same destination at 17/ per quarter.

The harvest in Canada has, it appears, been abundant, though rather late, on account of cold weather.

We may mention as a curious circumstance, the import of some flour from Calcutta, the first we believe that has ever arrived in this country from the East Indies. It is represented as being mostly fit to make bread of the most nutritious quality.

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

A PLAN FOR THE COMMUTATION OF TITHES, AND THE IMPROVEMENT OF THE PAROCHIAL ECONOMY IN ENGLAND.

By the Rev. JOHN THOMAS TRYON, Bulwick Rectory, Northamptonshire.

HAVING for many years past witnessed the distressed state of agriculture, and the ruin of many industrious and worthy families, (this year, according to Lord Milton's calculation in his pamphlet upon the Corn Laws, being the eighteenth), I think that the following observations, with regard to the present systems of assessing parishes, the present mode of paying and receiving of rents, as well as the present offensive custom of taking tithes in kind, may not be without some benefit in enlightening the minds of those landlords who are not themselves agriculturists, and the minds of the tenantry and of the community at large.

I shall endeavour to avoid any assertions or opinions which I shall not be able to substantiate either from practical experience or from arithmetical calculation; and, with regard to the subject of tithes, in proposing a method of commutation, I shall recommend nothing but what Scriptural authority, and practice, seem to justify, or bear me out in.

There are many gentlemen landlords who are practical far-

mers, it is true; but, as they are not under the necessity of supporting themselves and their families by their occupation, it is not extraordinary if they should not study so much the rules of "profit and loss," as to have the ability to exhibit to their friends either a fine Durham ox, a Herefordshire bull, a handsome Leicestershire sheep, or a pig buried alive in its own fat. Nor is it a matter of material consequence with them to ascertain whether they have gained five pounds or lost five hundred by their amusement.

We need not, therefore, be surprised if but few of them are acquainted with the causes of distress among their tenantry, and with the natural consequence thereof, viz. the impoverished state of their farms by the continual ingress and egress of the occupants: and if landlords are not acquainted with the causes of such distress, how can it be expected but that the clergy (most of them not being practical agriculturists) should be equally ignorant thereof, as well as of the evil effects of the tithe system, which at this present period is now become so oppressive to the tenantry, and prejudicial towards the improvement of agriculture.

Of this state of things, Lord Milton, as well as other political economists, complain; and they start it as a reason for the necessity of a change in the corn laws. They look to the corn laws as the origin of such agricultural distress.

"Look back to the last seventeen years" (he says in his pamphlet on the corn laws), "and tell me whether you have enjoyed agricultural prosperity?" The answer from all quarters is, No! He continues, and tells us, "that, in the short period of five years, the price of wheat varied from 120s. per quarter in 1817, to the low price of 40s. per quarter in 1821–22. The average of the year 1817 (he says) was 94s. per quarter, and in 1822 the average was 43s. per quarter; and from these prices it kept fluctuating during these five years. The consequence of this state of things cannot have escaped your recollection. Great difficulties had been felt by the agricultural interest in 1814, 1815, 1816; but the difficulties of all former years were surpassed by the distress of the winter of 1821–22. The insolvency of the tenantry at this period was unparalleled in the history of the agricultural classes, and the inefficacy of the act of 1815 was so universally acknowledged, that an alteration in

the law was made in the session of 1822; but the alteration being contingent upon circumstances which never occurred, no permanent practical change was made till the year 1828, when the prohibitory system of 1815 was in virtual operation. How far it secured you from a diminution of rental, your tenants from insolvency, and your estates from injury, every landowner in England can testify. I am here, however, principally entreating your consideration of the effects produced upon the agricultural capital of the country. Year after year the value of the farmer's produce had been diminishing, till it fell to little more than half the price at which Parliament considered that he could be remunerated for his industry.

"Year after year he was deluded by fallacious hopes, excited by the law itself. His rent was paid out of his capital, instead of out of his profits, till that capital became insufficient for the proper cultivation of the land; and then you yourselves began to feel the calamity by which many of your tenantry had been already overwhelmed. Compare, then, the situation of that tenantry under the protection of the corn laws of 1815, with what it probably would have been had the trade been avowedly free; or if you had been contented with the protection afforded by the law of 1804, under which it would have been practically free. Prices would indeed have lowered, but no such extravagant hopes would have been excited—no such erroneous calculations would have been made—rents would have fallen to a level, corresponding with the price of grain—the agricultural capital of the country would have been unimpaired—and the land would have remained in a better state of cultivation. Your nominal rentals would have been diminished, but your rents would have been collected with facility, and you would not have been driven time after time to the wretched expedient of returning a per-centage to your tenants at each successive audit, in order to induce them to remain upon their farms,—an expedient which proclaims to your fellow citizens, that those who resort to it are in the habit of demanding from their tenants a larger rent than they are capable of paying. Nothing, I must confess, is more distressing to me than to witness these half-yearly annunciations of this mis-called liberality, but rather of extortion: that the return of part of the rent may be proper, when called for by

temporary calamity, by the effects of flood, or by storm, or by some accidental misfortune, overwhelming a particular tenant, or class of tenants; but that, when resorted to habitually, it is not to be justified; that it convicts those who have recourse to it of continued attempts to extract from their tenantry a rent not warranted by the value of agricultural produce; and that, so far from proving the liberality of the landlord, it affords testimony of a very different quality."

I have quoted the above from Lord Milton's pamphlet on the Corn Laws, the organ of the theoretical political economists, to point out the causes they assign for the late agricultural distress, and their remedy for the evils thereof. They say that fluctuating prices of grain have been the cause of the late distress; that the price has been too high; and that a free trade in corn, or, in other words, "cheap corn," is the only remedy to prevent a recurrence of such distress: it is the *bonum desiderandum;* and it is the quack cure for every distress in agriculture.

If it was necessary for any logic beyond common sense to refute such arguments and opinions, my arithmetical tables at the end will most fully disprove that "cheap corn" can possibly bring agricultural prosperity, but it must inevitably entail upon agriculturists certain and speedy ruin. We must, therefore, look out for some other remedy to cure or heal the distresses of agriculture, or we shall trust to a deceitful staff.

I differ much in opinion with his Lordship with regard to the causes of the late distress of agriculture, and of the consequent ruin to the tenantry, which I do not attribute so much to the great fluctuations in the price of grain, as to the present barbarous system of paying and receiving a fixed rent, as is customary in this country.

From the great fluctuations in the price of grain which so often occur, a fixed annual rent and a just one cannot be attained nor ascertained; since, as Lord Milton says, wheat has varied in the short space of two or three years from the price of 120s. per quarter to 40s. per quarter; and, therefore, the value of farms would vary in almost similar ratio: in the first case, when wheat averaged 120s. per quarter, the same farm might be worth 60s. per acre; in the latter case, when wheat averaged only 40s. per quarter, the same farm might be only worth 20s. per acre.

Many nations of the Continent receive their rents after the mode of taking a portion of the produce per acre; but we have become too refined a people in our ideas to think of such a method: still, if we pursued the system of taking a load of grain from the produce of every acre, after the following manner, it would be a more rational plan to get a just rent than the one we now pursue. For instance, if we took a load of the produce per acre drawn by two donkeys, supposing the rent of a farm to be 10s. per acre; a load drawn by two mules, supposing the rent to be 15s. per acre; a load drawn by two horses, supposing the rent to be 20s. per acre, &c., we might probably obtain a much more equitable rent than we get after the present system pursued, since grain is known to double its value in the course of a year.

I do not charge landlords with having received more than their just due for the last seventeen years, taking them collectively; but they have not received them in a just proportion from each individual tenant during each particular year; they have received too little one year, and too much another.

The times have puzzled surveyors, and especially those who are not themselves practical agriculturists. They, according to their statistical records, value land after this fashion, or they wish to be supposed so to do. They say that they allot one-third of the produce for the landlord, one-third for the tenant, and one-third for his expenses.

Is this the plan they have pursued for the last seventeen years? Certainly not! But they have estimated land after the following mode, and which my tables at the end will testify: they have allotted one-half or three-sixths for the landlord as rent; one-third or two-sixths for expenses; and the poor tenant, like a drowning rat, catches hold of the remainder, one-sixth, or of what he can get.

This has been the great cause of the ruin of the tenantry. For the last seventeen years landlords have received a greater portion than they used to do, when grain bore a more steady and higher price; nor will I exempt the clergy, their portion of one-tenth of the produce taken in kind, has been more oppressive to the tenant for the same reason, "lower prices." Neither landlord nor tenant have received or paid their rents according

to the fluctuating prices of grain in the market, nor have the clergy regulated the value of their tithes accordingly. The tenets of land-surveyors are no longer adhered unto, nor yet is their theory according to their practice. Their suppositions might have been true with regard to high or war prices of grain, but where do they act up to such theories now in their valuations of land? I will not accuse them of partaking either of the voracity or of the sagacity of the swine species, but they constantly appear to be possessed of more than human power in their ocular perception, after the nature of swine, which are supposed to see the wind; for by one peep over a hedge, or a sagacious look through a style, they can return, they think, to the landlord such a just estimate of his rents, to within a fraction of a farthing, that it would almost amount to an act of felony to dispute it.

This is the cause of so many farms being tenantless; the surveyor's estimate cannot be obtained; he, probably, having got more pounds per cent. for valuing, than the poor tenant would get pence from the cultivation of it.

But how truly ridiculous is it to see landlords so sturdy in such estimations, since landsurveyors, even if they should be practical and experienced men, cannot return a just and true estimate of land beyond the very day they value it: for my tables will prove beyond contradiction, that if the mean collective average price of wheat, barley, oats, beans, varies in the market five or six shillings per quarter, so will the value in the rent of land vary five or six shillings per acre, so far as regards land of the rent of thirty shillings per acre.

What ignorance, therefore, is displayed upon the part of many of the landlords and tenantry in the letting and taking of farms. Many farms I have known in my own neighbourhood which are, and have been, for years tenantless, because the surveyor's estimate cannot be obtained to within one or two shillings per acre. I have known also many tenants take farms at such rents, that there was not the least prospect of the produce repaying them, either for capital or trouble, even if the seasons should have proved favourable, or their lands had been in such condition as to yield a fair average quantity. But from the ruin of so many of the tenantry, the remainder have become more cautious; their

fingers have been so often burnt, that they have at length discovered that the landlord's return of 5 or 10 per cent. will not do. The return spell has exhausted its charms; nor does it any longer give them confidence, for they are becoming sensible that a fall from L.3 to L.2 per quarter in the price of wheat, requires a reduction of half the rent, or a return of 50 per cent. If there is crime in usury in taking more than 5 per cent. for money, and which the law asserts that there is, surely it is the same offence for landlords to take some of them 10, some 20, some 50, and some even 100 per cent., in their rents for land; and which tenants often pay after the present system of paying their rents. They have in many instances paid double, beyond what equity and justice demanded for their farms, on account of the great fluctuations in the prices of grain.

This is the cause of so much distress of late years among the tenantry. Herein I differ from Lord Milton; he wishes to reduce the price of grain by a free importation to render your rents a nullity, and to prevent grain from fluctuating; I would have your rents vary according to the price of grain in every county market, to preserve the tenantry solvent, the labourer employed, and both happy and contented; for it is but just that the landlord should bear the effects of fluctuation in price.

Having considered the present unjust system of paying and of receiving of rents, I shall now advert to the present bad system of assessing parishes; inasmuch as some parishes are assessed at rack rent, some are assessed at an assumed rent, and others are assessed after some old rent. Now, it is evident that, if county rates are paid, or its assessments made after the mode of so much in the pound of rent, it is manifest that those parishes which are assessed at rack rent, pay much more than in justice is required of them, over and above what those parishes do which are assessed after some old rent.

Again, in a parish where one farm has been valued when wheat perhaps averaged L.4 per quarter, another valued when perhaps wheat averaged L.3 per quarter, and another perhaps when wheat averaged L.2 per quarter, it is evident that assessments made after such valuations must be unjust and inequitable. There are innumerable instances of this injustice; but I shall

mention only this one, which will be sufficient, which has occurred in my own parish, to go no further.

For ten years, about two-thirds of our rate-payers paid after rack or their real rent, the other third paid their assessment according to the rent they chose to return. Their real rents could not be ascertained, and for ten years our parish was assessed after this fashion, dreading the expence of having the parish newly surveyed. This state of things continued for ten years, till at length the two-thirds thought proper to make a return of reduced rents to meet the above evil; and after this sort of probably unequal assessment, our parish is at this present time rated.

I mention this one instance of injustice in the present mode of assessing parishes, to shew how much fraud and deception must take place in larger parishes, with respect to returns of rent for assessment; and the more our poor rates, &c. increase, the greater will be the roguery practised. The difficulties of getting at the real rents are great; tenants, as well as some land proprietors, esteem deceiving overseers as no very heinous crime, no national or personal robbery, but rather a species of ingenuity or sagacity. Herein, therefore, at the fountain head, I would wish to begin my system of reformation, viz. let all parishes be newly surveyed, and an estimate taken of every farm and lands therein, taking, in every instance, such estimation after the same given price of grain; and that price which I should recommend, should be the prices under which this country is not supposed to be able to grow it, viz. L. 3 per quarter for wheat, and L. 1, 10s. per quarter for barley, oats, and beans; and then we should have all parishes assessed after the same equitable standard.

I shall now advert to the subject of tithes, which has lately, and does at this present moment, much occupy the attention of the public. "To be or not to be," that seems now to be the question. We have now a strong party in the country, wishing that "they shall not be;" and, therefore, it behoves the friends of that Church, of which it is prophesied "its enemies shall not prevail against it," to eradicate the evils therein that have grown up with time, and dry up those offensive sores which, as boils and blains, are exhausting the very trunk of its existence.

The time has now arrived when we must consider our own interest, and the interest of our Church, in reference to, and in conjunction with, the altered state of things, attending to the wishes of the community at large.

Whether as a body we wish to found our right and title to tithes on the civil law of the land, or on the benevolence of private individuals confirmed to us by legal enactments, or as established by the Mosaic law for the support and maintenance of God's priests in every age of the world; on whichsoever of these titles we wish to found our claims to tithes, still the times call for an alteration in the mode of collecting them, or for a commutation in lieu of them;—since they have become so oppressive to the tenantry, so injurious to the prosperity of agriculture, and so revolting to our characters as "the humble and lowly-minded ministers of the Gospel," which was designed to "bring peace and good-will to men on earth."

It is supposed by some that the Gospel has not sanctioned the payment of tithes, but I think that is an erroneous opinion; it is remarked by our Saviour himself, "that the labourer is worthy of his hire;" and also he chided the Scribes and Pharisees, saying, "Ye pay tithe of mint, anise, and cummin, but ye have omitted the weightier matters of the law, such as judgment, mercy and faith; *these things ought ye to have done*, and not to leave the other *undone*."

It has also been objected that the clergy should not be supported with allotments of land, under the supposition that the cultivation thereof would too much occupy their attention. This may be said partly with some degree of truth. I feel the advantages and disadvantages arising therefrom in my own case, but it should be remembered, that it is fully as innocent an amusement as other diversions, shooting, fishing, &c., and, moreover, in many cases it gives the clergyman an opportunity of much benefiting his parishioners, either by the employment of the industrious, or by restraining, by his frequent presence, the wanton oaths and imprecations, that are wont so frequently to fall from the mouths of the lower classes. Therefore allotments of land on the whole to the clergy, probably do prove an advantage to the parishioners. Nor does it militate against the Mosaic ordinances, for there was portioned out for the priests and

Levites, the suburbs as well as the cities, the latter for themselves to dwell in, and the former for their cattle to *pasture* on.

Human laws at different times have provided the clergy with power to collect tithes in kind, but it should be remembered that our system of collecting in such a particular manner has been sanctioned by the Legislature alone; and that it is equally in the power of the Legislature to repeal it, as it was to enact it. Were not our right and title to tithes founded on higher authority, they would not have remained until this period.

But the origin of taking tithes in kind was appointed by the Almighty himself for the Jewish nation; and therefore, by the total abolition of them, we should appear to doubt his wisdom in the appointment.

The sort of title to which the clergy founded their right to tithes, in a council passed at Calcuth in the year 787, rested entirely upon the ordinances of the Mosaic institution, and it was specified in a canon, that tithes must be paid, *as it is written in the law.* On the other hand, it will be easy also to shew, that the civil right of tithes in England also had its origin in that source which alone could give to it duration and stability, viz., the legislature of the nation. Upon that account, therefore, of our right to tithes being founded upon the high ground of the Mosaic ordinances, I should lament to witness the necessity of a total abolition of the same.

Offa, king of the Mercians, in the year 793, passed a law conferring the tithes of all his kingdom upon the church, and ordaining his subjects to pay them regularly under severe penalties. William the Conqueror, on his accession to the throne of England, framed a collection of laws, called the laws of St Edward, which forms the groundwork of the English common law, and which confirms to the clergy the right of tithes.

That we may discern the difference between his laws of tithe (which are not very dissimilar from those now in force) and the Mosaic tithe laws, I shall quote them, as they are to be found in the Consilia Britannica, viz. "Of all corns the tenth sheaf is due to God, therefore let it be rendered. And whosoever has a herd of mares, shall render the tenth colt; and if he have only one mare or two, he shall pay for each colt one penny. In like manner, whosoever has several kine, shall render the

tenth calf, and if he have one or two, he shall pay for each calf one penny; and whosoever makes cheese, shall give the tenth cheese to God, and if he does not make cheese, he shall give the tenth day's milk. In like manner every one shall give the tenth lamb, the tenth fleece, the tenth part of the butter, and the tenth pig. In like manner of bees, the tenth part of the increase, also of woods, of meadows, of waters, of mills, of parks, of ponds, of fisheries, of orchards, of gardens, of the profits of trade, and every thing which the Lord has given, the tenth part shall be restored unto him, by whom the nine parts, as well as the tenth, have been bountifully bestowed." Thus it appears evident, that our civil laws, with respect to tithes, are founded upon the ordinances of the Mosaic institution, which give them a higher title to our esteem. But let us consider in what the above laws concerning tithes (on which those now in force are grounded), differ from the laws of Moses, given him by the Almighty himself from Mount Sinai. We shall find them in the 27th chapter of Leviticus, viz. "And all the tithe of the land, whether of the seed of the land, or of the fruit of the tree, is the Lord's: it is holy unto the Lord. And if a man will at all redeem ought of his tithes, he shall add thereto the fifth part thereof. And concerning the tithe of the herd, or of the flock, even of whatsoever passeth under the rod, the tenth shall be holy unto the Lord." "And if he that sanctified it will redeem his house, then he shall add the fifth part of the money of thy estimation unto it, and it shall be his." The same laws of tithes is repeated in Deuteronomy, 14th chapter, 22–23, viz. "Thou shalt truly tithe all the increase of thy seed, that the field bringeth forth year by year. And thou shalt eat before the Lord thy God, in the place which he shall choose to place his name there, the tithe of thy corn, of thy wine, and of thine oil, and the firstlings of thy herds, and of thy flocks: that thou mayest learn to fear the Lord thy God always."

Herein we may observe the expression used in the Mosaic law concerning the tithe of corn, is different from that used in our own civil laws of tithe. In the Mosaic law, as it is expressed in Leviticus is, "all the tithe of the land, whether of the seed of the land," &c., and in Deuteronomy the expression is,

"Thou shalt truly tithe all the increase of thy seed, that the field bringeth forth year by year." But in the laws enacted by William the Conquerer, it is expressed thus, "Of all corns the tenth sheaf is due to God, therefore let it be rendered."

Thus it appears, that in the Mosaic dispensation the tithe refers to the seed only, whereas in our laws it refers to the straw, as well as the seed. But if the expression of increase of seed, or tithe of the seed, appears to be dubious with regard to their real meaning, I think that the following passage, quoted from the 18th chapter of Numbers, will make it clear that the Levites were allotted only a tithe of the seed, viz. "But the tithes of the children of Israel, which they offer as an heave-offering unto the Lord, I have given to the Levites to inherit: therefore I have said unto them, Among the children of Israel they shall have no inheritance. And the Lord spake unto Moses, saying, Thus speak unto the Levites, and say unto them, When ye take of the children of Israel the tithes which I have given you from them for your inheritance, then ye shall offer up an heave-offering of it for the Lord, even a tenth part of the tithe. And this your heave-offering shall be reckoned unto you, as though it were the corn of *the thrashing-floor*, and as the fulness of the wine-press. Thus you also shall offer an heave-offering unto the Lord, of all your tithes which ye receive of the children of Israel: and ye shall give thereof the Lord's heave-offering to Aaron the priest. Out of all your gifts ye shall offer every heave-offering of the Lord, of all the best thereof, even the hallowed part thereof, out of it. Therefore thou shalt say unto them, When ye have heaved the best thereof from it, then it shall be counted unto the Levites, as the *increase of the thrashing-floor*, and as the increase of the wine-press. And ye shall eat it in every place, ye and your households: for it is your reward for your service in the tabernacle of the congregation. And ye shall bear no sin, by reason of it, when ye have heaved from it the best of it: neither shall ye pollute the holy things of the children of Israel, lest ye die."

From the above passages, I think it is clear, that, by the laws of Moses, the priests and Levites were only permitted to take a tithe of the seed, as "the increase of the thrashing-floor;" but, in our tithe laws, the straw also has been inadvertently granted

to the clergy, which give to them an unjust advantage over the tenantry in fixing a value upon them. There are many instances where the rent is only 20s. per acre, I have known the clergy to take 7s. per acre for tithe, which is one-fourth, if the rent and tithe be added together. Whereas the Scripture portion is one-fifth of the estimation or rent, if any would wish to redeem; so that, by taking the straw, or the manure, as well as the seed, they obtain from the tenantry about 2s. per acre more than is their just due, according to the Levitical law. This general permission to redeem appears to me the only thing wanted to render tithes less oppressive, together with a legal provision that the manure arising from tithes should always be returned to the farms from whence it came, if the present mode of taking the tenth sheaf should be more convenient than taking the tithe of corn from the thrashing-floor. The portion of the estimation or rent, was fixed in the Mosaic law to be one-fifth part; and this one-fifth part I should propose as a compensation or commutation for our tithes, to be paid to the clergy either by the landlord or by the tenant, if either wished to redeem them; it would, by my tables at the end, be found to be equal to about one-tenth of the produce. And this one-fifth of the real rent should be the portion I propose as a commutation for tithes.

One-fifth of a just rent would, in all cases, be an adequate compensation, if the rent was estimated according to my system. And I may here observe, that if any improvement be made in land, such as converting boggy land into a state of cultivation, &c., I should propose that, after ten years, when it might reasonably be supposed that such improvements had repaid the proprietor, then an estimate should be taken of it as a standard rent, whereby to assess it, and from which tithes then might be taken in a just ratio. This is my proposition for commuting the tithes of the kingdom, most simple in theory, and just in practice; such it would be found, both as it regards the clergy, the tenant, and the landlord: and it is not attended with the evil of abolishing a system which was appointed by the Almighty himself, as a provision for his priests.

A compensation for vicarial small tithes might be agreed upon, after a similar plan of payment, out of a portion of the rent. The evil attendant upon the system of the clergy taking away

the straw, is great and oppressive; it is very prejudicial to the prosperity of agriculture, inasmuch as the loss of it diminishes the fertility of the soil, and consequently its produce; and, in the end, it will reach the clergyman himself, so far as his tenth sheaf will grow less bulky, after a few years of taking tithes in kind. A tax levied in kind in this country, and at this period of the world, without reference to any other circumstance, which requires a certain portion of the gross produce of land, is only suited to a very rude state of society, and is an imperfect method of cultivation, both as regards tithes and rents. After such a manner, rents, as well as tithes, are paid in many countries on the Continent; but such a mode of raising a tax from land is no longer suited to the state of society in this kingdom. Our present method of taking tithes in kind has outlived the barbarous times in which alone it could be tolerated. The feeling which made it a religious duty has at length passed away; and circumstances have arisen which render it almost insupportable. I allude to the heavy taxes and rates that are now engrafted upon the soil, which render a tithe of the produce doubly oppressive to what it formerly was. The more society advances in civilization, the less will the practice of taking tithes in kind be found suited to the present altered state of things.

The great evil of the system is, that it cripples the prosperity of agriculture, and diminishes production. So manifest are the bad effects of this system, that it would be wisdom in the present generation of the clergy to unite in applying some remedy for its alleviation.

The country now calls for a real commutation, and not a half measure, which might leave the real evil unredressed in all its essential points.

The objections which the bishop of Bath and Wells starts himself against his own system of commutation of tithes for land, I think, in many cases, would be insurmountable, and, upon that account, the system would be impracticable as a general measure; and it is a general measure which is now required. His objections are "the difficulty of procuring land convenient to each parish," &c.

There is something so sacred in the name of tithes, and in the appointment of them, as a scheme devised by the Almighty

himself for the maintenance of the Levites and priests under the Mosaic dispensation, that I think a religious nation would rather see them better regulated than abolished altogether, which they must be, if land is to be allotted in the lieu of them; and a total abolition of the system would render us liable to animadversion, as apparently impeaching the wisdom of God in such appointment as a provision for the priesthood. Upon this account, I shall lament to witness a total abolition of the system; more especially since we have the ability of so regulating the redemption of them, as will render them far less oppressive to the tenantry, by giving them permission to redeem them by the payment of one-fifth of the real and actual rent to the priest.

The same bishop has also in his pamphlet expressed his objection to the commutations and compositions that have been approved of, and carried into effect under the authority of the legislature. "Their success," he says, "has been hitherto by no means such as to recommend their general acceptance and adoption."

"To this commutation law, with regard to a corn rent," he says, "the great variableness in the price of grain forms the main, and indeed an insuperable, objection to the general adoption of this plan." This plan of commutation was devised "by Bishop Tomline; and the effects of the great fluctuation in the price of grain which we have witnessed, render this system almost impracticable."

The same bishop further continues,—"Another act for facilitating a composition for tithes, and of a nature somewhat similar to that above mentioned, was brought into Parliament during the last session, by our most reverend Metropolitan. By this measure, it was intended to be enacted, that an incumbent, "with the consent of the owners of two-thirds in value of the land subject to tithes," should appoint commissioners, and make agreement for a composition-money, to be charged for any term "which did not exceed twenty-one years." But this bill for composition appears to be in one, and that a most important, point far less eligible than the bill for commutation. By the latter bill, tithes are commuted without any prospective alteration; by the former measure of composition, the ascertainment of the value of tithes would be an evil continually recurring. Thus would all

those feelings be kept alive which form the ground of dissension between the clergyman and his parishioners, and tend to diminish his means of doing good among them."

Thus has the forenamed bishop pointed out the evils attendant upon the measures of commutation and composition that have already been sanctioned by the legislature.

My system will be exempt from these evils. It neither will be accompanied with those attendant upon the above commutation act, viz. "the evil that attends a corn-rent, with regard to the fluctuations in the price of grain;" nor will it be attended with those bad effects that are entailed upon the above composition system, viz. "the evil of the continual ascertainment of the value of tithes, and the feelings which such ascertainment would engender between the clergyman and his parishioners."

The commutation which I propose for tithes would adjust itself, viz. "a fifth of the real rent, ruled by the average price of grain in the county market;" and, consequently, it would not engender any hostile feelings against the clergy, either on the part of the landlord or of the parishioners. And I propose that, in case there should be no agreement with the landlord and tenant, with respect to the "average rent," in that case the clergy should always take a fifth of the "standard rent." *

Thus having pointed out the evils that attend the present system of assessing parishes, and the present bad method of paying and receiving a fixed rent, which now no longer is applicable to the prosperity of this country, as well as having animadverted upon the prejudicial system of collecting tithes in kind, I shall therefore now proceed with the remedies I propose to obviate these evils, or correct them.

My first proposition is to remedy the present evils attending the system of assessing parishes, and which remedy will be found simple in theory and easy in practice. I would have the lands of every parish in the kingdom valued after the prices of grain,

* The "average rent" could easily be ascertained every year by the verdict of a jury, composed of farmers and corn-dealers, constituted by the High Sheriff of each county, and founded upon the evidence of all who have bought and sold grain in the county of the preceding year's crop, in the same manner that the "fiars" prices of grain are ascertained every year for the purpose of paying the stipend of the clergy of the Church of Scotland.—Ed.

at which this country is supposed to be able to grow it, viz. L.3 per quarter for wheat, and L.1, 10s. per quarter for barley, oats, beans.

Thus a standard rent would be obtained, by which all rates of every description would be assessed in every parish of the kingdom; and which never should be altered without legislative authority, or by a commission appointed by them.

The growing evils of our poor-laws call loudly for such an equalization of assessment. The interests of agriculture require such a revision. It would enable the Legislature to arrive at a sound estimate of church property as well as the national property hereafter, if it was required. And this rent, or valuation, whatever it might be, should be termed the Standard Rent.

After this method would I wish to remedy and correct the abuses that attend the present system of assessing parishes. All should be assessed alike after the same price of grain, as above stated. It would put a stop to the frauds and deceptions that are now practised in the return of false rents. The distressed state of agriculture, the growing burden of the poor-laws, as well as reason itself, demand the adoption of such revision in the system of assessments.

I shall now, *secondly*, point out my remedy for correcting the evil that attends the present system of paying and receiving rents; and this remedy will also be found to be practicable and simple.

Having first established "*a standard rent*" for each particular parish, according to the above rules, by which all assessments should be made, and consequently "a standard rent" for each particular farm, — I then should propose "*an average rent*," to be regulated according to the mean collective average price of the four sorts of grain in the market, viz. wheat, barley, oats, beans, to be added or deducted from the standard rent, as the average of the price of grain increases or decreases. And which average price should be ruled by every county market, in which each parish was situated; and the average price of the markets should be published half-yearly in the county town a week or fortnight before Lady-day or Michaelmas-day. I should also propose, that the ratios which the average rent should bear to the average price of grain in the county market,

should be the following, increasing or decreasing from the standard prices of grain, viz. L. 3 per quarter for wheat, and L. 1, 10s. per quarter for barley, oats, beans, in the standard column.

In the standard column of my Tables, where 30s. per acre is the value of the farm, the average rent would bear a similar ratio of increase or decrease with the mean collective average price of grain; that is, rents should be increased or decreased by the increase or decrease of every shilling in the mean collective average price of the four sorts of grain in the county market: for it is proved in my arithmetical tables, that lands of the standard rent of 30s. per acre, will bear that similar ratio, viz. 12d. in the increase or decrease of the average rent for every variation of 12d. in the mean collective average price of grain. But with regard to lands of an inferior price and quality, my system would be found as applicable to them as to lands of a superior nature. The following is what I propose to rule the ratios of their average rents to the average price of grain, viz. As the price of land of 30s. per acre is to its ratio 12d., so is the price of land of any quality and value per acre, to its ratio. For instance;

If the standard rent should be

s.			s.	d.		s.	d.	
10	per acre,	then, as	30	12	::	10	4	its average ratio to rule the average rent.
15	do.	then, as	30	12	::	15	6	do.
20	do.	then, as	30	12	::	20	8	do.
25	do.	then, as	30	12	::	25	10	do.
30	do.	then, as	30	12	::	30	12	do.
35	do.	then, as	30	12	::	35	14	do.
40	do.	then, as	30	12	::	40	16	do.
45	do.	then, as	30	12	::	45	18	do.
50	do.	then, as	30	12	::	50	20	do.

This is the table of ratios I should recommend to rule the average rent with regard to the average price of grain in the county market, and in regard to the different prices per acre in the quality of land; but let me observe, that it would be quite an optional agreement between the landlord and the tenant; and it would be an equal chance on either part, whether

the "average rent" would have to be deducted from or added to the "standard rent." Upon this account my system would be a great check against the usurious landlord; and, therefore, I think that it would be most beneficial, if it was adopted in Ireland also, a country in which so much underletting is permitted, to the distress and injury of the tenantry.

After the above system, landlords would obtain a fair and equitable rent annually, without the offensive use of "discharges," than which nothing is more detrimental to agriculture, or prejudicial to its best interests. Tenants would never again be required to pay more than justice and equity demanded. I have proposed the above distinction in the ratios, since land of an inferior price and quality cannot be supposed to grow in like quantity compared to that of a better nature and value; therefore, the average rent of such lands would not in equity increase or decrease in the same ratio with the average rent of a superior quality. In my system, a just estimate of the "*standard rent*" would be, what every one would desire for his own interest; for, if estimated too high, it would be subject to the payment of more rates; if too low, it would be to the tenant's advantage. It would, therefore, be to the interest of all, that the "standard rent" (by which all rates, levies, &c. would be regulated) should be estimated at its real worth, which is a great advantage in the system.

The benefits that would arise from this system of paying and receiving rents would be many and great.

1*st*, It would prevent the future general ruin and distress of the tenantry, by regulating their rents according to the price of grain.

2*dly*, It would prevent them from being under the necessity of cringing like mendicant beggars to the caprices of the usurious and griping landlords for a return of rent, which, in justice and equity, the one ought not to pay, nor the other to demand.

3*dly*, Landlords would always obtain a just and fair rent, without the offensive use of discharges, which, under the present system, are necessary on any great and sudden rise in the price of grain to obtain a just rent, and which are the origin of much displeasure and animosity.

4*thly*, The state of agriculture would be much improved, the

tenantry would be once more attached to their farms, and have much more interest in the good management of their parishes; and it would put a stop to the evil of their continual ingress and egress to and from different farms, which is very injurious to the good management, and consequently to the fertility of the land, as well as such continual changing promotes the increase of the poor-rates.

5thly, A just commutation for tithes might be amicably allotted, by taking one-fifth part of the actual and real rent, the proportion allotted to the Levitical priesthood, after their mode of redeeming tithes; and which will be ascertained by the aid of my Tables, to be equal to about one-tenth of the whole produce of the land.

6thly, It would be as advantageous to the tenantry as granting to them leases; for they would not be under the continual dread of discharges at every variation in the price of grain, which is very prejudicial to the fertility of the soil. They also would be able to find more employment for their labourers with more advantage to themselves, (as no longer being birds of passage), and that more regularly than they possibly can when distressed themselves, "for the labourer's prosperity is dependent upon the tenant's."

7thly, It would render the revenue of the kingdom more firm and stable, since it would preserve the agriculturists, that is, three-fourths of his Majesty's subjects, more solvent; and the labourers more prosperous, and, consequently, more able to consume the taxed articles and necessaries of life; and also it would greatly improve the markets for manufactures of every description.

8thly, If the system was extended to Ireland, it would render to her such a bonus, as she never before enjoyed; for it would put an end, in a great measure, to the usurious and griping agency of the underlings of landlords; and the prosperity of its agriculture would be placed on an equal footing (if poor laws should ever be enacted for that country) with our own.

Having now considered the benefits to be derived in the change of the system of paying and of receiving rent, I shall now, *thirdly*, proceed to the remedy I propose for the evils of the present system of collecting tithes in kind, which has be-

come so prejudicial to the prosperity of agriculture, and so oppressive to the tenantry.

As a just commutation for tithes, I propose that the clergy should take one-fifth of the real and actual rent of land; and to ascertain this real rent (if the above system which I have proposed above were adopted), there would not be the least difficulty; nor would my plan be open to fraud or deceit with regard to the return of the average rent.

The laws of Moses gave the tenantry, or proprietors of land, the privilege of redeeming the tithes, of such houses and lands, &c. as were not devoted, and they made a legal regulation or provision for such redemption, viz. a fifth part of the real estimation was reckoned in these laws a just compensation or commutation for tithes. The real estimation must have meant either the actual worth of the land or house, &c. annually, which we term rent, or probably it might mean an estimation until the year of jubilee, or perhaps for perpetuity; and, therefore, the fifth part of the estimation must have meant a fifth part of the real worth of the house or lands for such particular periods. Therefore, taking the laws of God to Moses as my guide, the proportion being handed down to us, by which it was at the option of the Israelites to redeem their tithes, viz. by the payment of one-fifth part of the real estimation of rent, I shall therefore propose this same proportion, one-fifth of the actual and real rent, as a just compensation or commutation for our tithes, and which will be found in my tables at the end to be equal to about one-tenth or tithe of the produce of the land. It would be found to be a just commutation, and this one-fifth of actual rent (according to my system of paying and of receiving rents) would be always known, and subject to no fraud or deception, with regard to false returns of rent. For, as the "*standard rent*" in every parish might be always ascertained, so likewise the "*average rent*" might always be known, either at Michaelmas or at Lady-day, at whichever of these periods, the tenant might enter upon his fresh engagements with his landlord.

Thus, there would be no difficulty to ascertain the real rents of every farm, or lands in any parish, because it would be no object to the tenant to make a false return of his average rent, since the application of his return of average rent would be

equally liable to be used as a reduction from, as well as an increase to, his "standard rent." And when no average rent is returned, either by the tenant or by the proprietor, in that case the clergy should always take the one-fifth of the "standard rent," which might prove fully as advantageous to him, as calculating also upon the increase or reduction of the "average rent." Therefore it appears that there could be no fraud or deception (according to my system) practised by the tenant in his return of his average rent.

The present system of rents is no criterion whatever of the value of farms, as they have been surveyed and estimated at such different periods, and under such different circumstances, with regard to the price of grain and stock. Therefore, to take one-fifth of such rents would not be a just equivalent for tithes, nor could they be ascertained without the greatest difficulty. The clergy would be exposed to every species of fraud and deception in the returns of them,—some farms being rented at double their intrinsic worth, whilst others are not at half their value.

I propose that it should be always optional with the proprietor or tenant to pay this one-fifth part of the annual real rent, or otherwise the clergyman's remedy should be to take them in kind; but it should be legally provided for, and understood that the manure arising from the straw or hay, &c. should be always returned to the farm from whence it came, if this system of taking tithes in kind should be esteemed more convenient than the system of taking the tithe of the "increase of the thrashing-floor *."

Thus I have proposed my measures for revising the present system of assessing parishes, for remedying the evils attendant upon the present system of paying and of receiving

* We would here venture to suggest that the payment of the commutation of tithe computed according to the system which Mr Tryon so ably recommends, should be made *imperative* on the *landlord;* and that the tenant in all cases should be exempted from paying *tithes* to the *clergyman*, either in money or in kind; for this particular, and we think of itself sufficient reason, that the people should have no pecuniary transactions with their pastor. "Ignorance," in either party of the peculiar traits of character displayed by the other in pecuniary matters in such an instance, "is bliss." Let the landlord pay *all* the burdens which affect his land, and consequently let the tenant pay the *whole* of his rent to the landlord. The moral effect of this system of paying tithe is quite apparent in Scotland, where no disagreeable feelings can be engendered between the parishioners and their clergy-

rent; and also I have proposed my plan of commutat tithes, viz. by giving the clergy in lieu thereof one-fifth real rent of the land; and for which method of commu I am happy in being able to say I have scriptural aut I shall therefore now give two tabular arithmetical c tions, to explain how this my system would work, pared with the present system of paying and receiving But before I give them, I shall make the following vations with regard to pasture and grass-lands, which some men might think could not be regulated after this —To this I answer, that they would be justly regulat regard to their annual value or rent, after the above r regulating the annual value of arable land, viz. by t collective average price of grain in the county markets.

It is an old and true saying, "down corn, down Every jobber and grazier in the kingdom tell th is the case. I may observe the same of bu 's gentlemen will refer to their household acco s, t wi rally find that "cheap bread" is accompanied with "c and *vice versa*.

In 1821–22, when wheat was at the low price of I quarter, the farmer's price for fat meat, which he was ob was only 4d. per pound; and when wheat has bore the L. 4 per quarter, then we have had the farmer's price of meat as high as 8d. and 9d. per pound: therefore, I may be considered that the price of the one is ruled price of the other; and, consequently, it would be no si tion whether pasture or feeding lands were estimated f average rent by the meat-market, or by the average pric corn-market; since, as the average price of the corn-mar or rises one-sixth part, so generally does the price of f vary in the like proportion of one-sixth part, that is, on either above or below the standard price of 6d. per lb.

In my tables of calculation, in the standard column

man; for the latter never meets the former but as "a messenger and good will." No outcry against tithes exists in the land; an proportion of the tithes which support the ministers of the Church land are paid, and paid cheerfully to, by the numerous proprietors embrace the doctrines and discipline of the Church of England. T are therefore most happy.—EDITOR.

assumed the farmer's price of meat to be 6d. per lb.; and it must be recollected that the price of meat and stock vary in each column one-sixth part, in the same proportion as grain varies. Therefore, it consequently follows that it matters not whether pasture and grass land are regulated in their value by the average price of grain, or by the average price of meat, since they are both supposed to vary in like ratio, that is, as grain rises or falls one-sixth part, so generally does the price of fat meat and stores rise or fall one-sixth part.

The same thing may be observed of store-cattle of every description. I may observe, that, at all events, under all circumstances, this system of regulating the average rent of grass and pasture land must always afford a juster rent than the present system of a fixed rent can possibly do.

I may also here observe, that the greatest average rent of land of the value of 30s. per acre in my system, cannot be more than 12s. 6d. or 6s. 3d. in each column, as I propose that the average price of grain shall not be calculated, either on the part of the tenant or landlord, above the prices of grain, viz. L. 4 per quarter for wheat, and L. 2 per quarter for barley, oats, and beans, or below the prices L. 2 per quarter for wheat, and L. 1 per quarter for barley, oats, and beans. Therefore, the ratios of pasture-land of every price and quality might be regulated after the same manner as they are for arable lands. And I may farther observe, that "accommodation lands" may always be let according to the pleasure of the proprietor, though the standard rent should have been fixed, whereby to regulate the assessment of such lands; and that the clergy in such cases would always be satisfied with a fifth part of the standard rent. Concerning the improvements of lands, such as turning bogs into a state of cultivation, or heath, or lands left by the sea, &c. I should propose that an increase of the present value of them should not be taken beyond the one-fifth of their present standard rent, until a certain time (say perhaps ten years), when the expenses of their improvements may have been repaid.

Thus I have given an outline of my system, which I think would be of the greatest benefit both to the landlord as well as the tenant (if put into execution), either as a general or as an individual measure; and which I think must in the end

be resorted to on account of the growing evils of the poor-laws, and on account of the great fluctuations of price that grain is subject to in this kingdom. It is a measure which would preserve the tenantry from future general ruin, the industrious labourer from poverty, and the land from turning to waste; as well as it would always afford the landlord his just and equitable rent, without the offensive and continual necessity for the use of discharges.

I shall therefore now explain what I have proposed in two tables of calculation, the one shewing the ruinous effect and result of the present system of paying rents by the tenantry, and the other proving the great advantages that would arise from my system, if it was adopted, both to the tenantry and to the landlords.

Let us take, for instance, a farm of fair quality of land, consisting of 400 acres, at the standard rent of 30s. per acre, including the value of the tithes, of which 200 acres shall be in pasture, and 200 acres in a course of tillage; of which (according to a proper course of cultivation)

¼ shall be wheat,
¼ shall be barley or oats,
¼ shall be beans,
¼ shall be turnips, or dead fallow.

And we will average the quantities of grain (according to the statistical estimates) to be two quarters and a half of wheat per acre, and four quarters of barley, oats and beans per acre; and we will assume the standard average prices of grain to be those under which it is supposed that this country cannot grow it, viz. L.3 per quarter for wheat, L.1, 10s. per quarter for barley, oats, and beans. And we will estimate the profits or produce on grass or pasture-lands to be L.2 per acre, exclusive of the keep for the necessary agricultural horses.

We will also estimate the expenses of labour, rates, bills, &c. to rise or fall in each column one-eighth part with the rise or fall in the price of grain, *i. e.* wages shall vary between the extremes of 9s. and 15s., making an increase or decrease of 1s. 6d. in each column, varying from the standard rate of wages 12s. for a man's weekly labour, *i. e.* one-eighth part.

I propose also that the average rent, and the average price of grain in the county markets, should never be estimated beyond

the price of L. 4 per quarter for wheat, and L. 2 per quarter for barley, oats, or beans; or beyond the mean collective average of these four sorts of grain (which in my table is 12s. 6d.) above the standard prices of grain; nor should they be ever estimated below the prices of L. 2 per quarter for wheat, and L. 1 per quarter for barley, oats, or beans, or below their mean collective average 12s. 6d. from the standard prices of grain, for the following reasons; since it never can be desirable or beneficial for this country to produce grain, either above or below such prices. It would be an unnatural state of the markets; and, therefore, should never be calculated upon for average rent, either in behalf of the tenantry or of the landlords.

In the estimation of labour, I shall assume for manual labour on 200 acres of arable land to be 20s. per acre, ... =	L. 200	0	0
Manual labour on 200 acres of grass-land, including sheep-herding, haymaking, fencing, &c., to be 5s. per acre, =	50	0	0
Poor-rates, roads, church-rates, &c., to be 5s. in the L. 1, =	150	0	0
For wear and tear of waggons, carts, ploughs, harrows, blacksmith's bills, &c., to be per annum, ...	50	0	0
	L. 450	0	0
So that we shall have these expenses in standard column to be	L. 450	0	0
Also for standard rent of 400 acres, at 30s. per acre, to be .	600	0	0
Therefore, total expenses will be . . .	L. 1050	0	0

These things being conceded, and it matters not whether gentlemen would wish to estimate the expenses differently, for the systems would shew a like conclusion in similar ratio of increase or decrease in the two examples.

I have thus fixed the above prices, as, from experience for the last twenty years, I have found them to vary but little from them.

I have, in the two examples, assumed a standard rent of 30s. per acre, as bespeaking a quality of soil which ought to produce the same average quantities of grain I have calculated upon, as well as it will render the explanation of my system more simple and easy, since such quality of land will bear the average rent to increase or decrease exactly in the same proportion with the mean collective average price of grain in the market; *i. e.* an increase or decrease of 1s. of average rent for every increase

or decrease of 1s. in the mean collective average price of grain above or below the standard prices.

According to the above rules, the following will be the results of the two systems of paying and receiving rents. The first table shews the result of the present system, and the second table shews the result of the system I propose. At the bottom of each column will appear the amount and difference of profit to the tenantry, which the prices of grain at the top will cause on the same farm; from whence will appear also the palpable absurdity of supposing that "cheap corn" will bring agricultural prosperity.

The tables will shew also in what proportion rents ought to vary, according to the different prices of grain in the market; they will also shew, that one-fifth part of the actual and real rent is equal to about the tithes of the produce. I am well aware, that the clergy will think themselves entitled to a tenth of the seed I have deducted from the total produce of grain; but if they will allow, that a tithe of that seed will not more than pay for the expenses in collecting their tithes in kind, as well as stocking and thrashing, and carrying to market, they will find, that one-fifth of the real rent would, in all cases, be a just compensation for a tenth of the produce.

I have taken the same quantities per acre as are generally allowed in statistical records, and I have made labour, rates, bills, &c. increase or decrease according to the price of grain.

Therefore I think, that the different amounts at the bottom of each column, will clearly shew correct results of the tenant's profits for his labour and capital, under the varying prices of grain at the top; and consequently they will prove, beyond contradiction, that "cheap corn" cannot possibly bring agricultural prosperity, even if rent as well as tithes were lowered one-half. I shall now, therefore, present my two tables; the first shewing the ruinous result to the tenantry after the present system of paying their rents; and the other is the system of my own proposing, which would preserve the tenantry ever hereafter from such general ruin again, if it were adopted, as well as it would afford the landlord a better rent, calculating upon a run of years; and, unless it should be adopted, all the corn laws in the universe will be of no avail to improve the condition of the tenantry in preserving them more solvent.

TABLE I. *Pointing out the ruinous result to the Tenantry after the Present System of paying their Rents.*

	STANDARD PRICES.			
When Wheat averages these prices per quarter, viz.	L.2 0 0	L.2 10 0	L.3 0 0	L.3 10 0	L.4 0 0
Barley, Oats, and Beans, average these prices per quarter,	1 0 0	1 5 0	1 10 0	1 15 0	2 0 0
Produce of 50 acres Wheat, averaging 2½ qrs. per acre,	L.250 0 0	L.312 10 0	L.375 0 0	L.437 10 0	L.500 0 0
Produce of 50 acres Barley or Oats, averaging 4 qrs. do.	200 0 0	250 0 0	300 0 0	350 0 0	400 0 0
Produce of 50 acres of Beans, averaging 4 qrs. do.	200 0 0	250 0 0	300 0 0	350 0 0	400 0 0
Total produce of Grain,	L.650 0 0	L.812 10 0	L.975 0 0	L.1137 10 0	L.1300 0 0
Deduct therefrom, for seed sown, ⅙th part, or about 4 strike per acre,	108 6 8	135 8 4	162 10 0	189 11 8	216 13 4
	L.541 13 4	L.677 1 8	L.812 10 0	L.947 18 4	L.1083 6 8
Add produce of stock on 200 acres, varying in each column ⅛th from standard, at L.2 per acre,	266 13 4	333 6 8	400 0 0	466 13 4	533 6 8
Total produce of Stock and Grain,	L.808 6 8	L.1010 8 4	L.1212 10 0	L.1414 11 8	L.1616 13 4
Deduct from which total expenses, viz.—Rent of 400 acres, at 30s. per acre in standard column, but allowing a return of L.20 and L.10 per cent. in the first and second columns,	L.480 0 0	L.540 0 0	L.600 0 0	L.600 0 0	L.600 0 0
Expenses of labour, rates, bills, &c. varying in each column ⅛th part from standard expenses, L.450,	⅛ lower 337 10 0	⅛ lower 393 15 0	450 0 0	⅛ higher 506 5 0	⅛ higher 562 10 0
From total produce deduct these total expenses,	L.817 10 0	L.933 15 0	L.1050 0 0	L.1106 5 0	L.1162 10 0
The Tenant's profits under the various prices of grain at the top, on the same farm,	Loss of L.9 3 4	Profits L.76 13 4	L.162 10 0	L.308 6 8	L.454 3 4

These different amounts at the bottom of each column are the difference of profits which the varying prices of grain at the top cause to the tenant on the same farm, from the loss of L.9 : 3 : 4 (although 20 per cent. has been returned to him), when grain is sold at the low price of L.2 per quarter for Wheat, and L.1 per quarter for Barley, Oats, Beans, as compared with his profits of L.454 : 3 : 4, when Wheat averaged L.4 per quarter, and Barley, Oats, Beans, L.2 per quarter. Such a system of paying and receiving rents, I think, cannot last much longer; it is the cause of all the distress of our tenantry, and the ruin of our farms. If the voluntary deduction of L.20 and L.10 per cent should not be returned in the first two columns, the tenant's loss would be L.129 : 3 : 4 in the first column, and his profit in the second column would be only L.16 : 13 : 4.

TABLE II. *After my own system of paying rents; shewing the beneficial effects that would arise to the Tenantry, as well as to the Landlord, if it was adopted.*

	STANDARD PRICES.			
When Wheat averages these prices per quarter, viz.	L.2 0 0	L.2 10 0	L.3 0 0	L.3 10 0	L.4 0 0
Barley, Oats, and Beans, average these prices per quarter.	1 0 0	1 5 0	1 10 0	1 15 0	2 0 0
Produce of 50 acres Wheat, averaging 2½ qrs. per acre,	L.250 0 0	L.312 10 0	L.375 0 0	L.437 10 0	L.500 0 0
Produce of 50 acres Barley or Oats, averaging 4 qrs. do.	200 0 0	250 0 0	300 0 0	350 0 0	400 0 0
Produce of 50 acres Beans, averaging 4 qrs. do,	200 0 0	250 0 0	300 0 0	350 0 0	400 0 0
Total produce of Grain,	L.650 0 0	L.812 10 0	L.975 0 0	L.1137 10 0	L.1300 0 0
Deduct, for seed sown, ⅛th part, or about 4 strike per acre,	108 6 8	135 8 4	162 10 0	189 11 8	216 13 4
	L.541 13 4	L.677 1 8	L.812 10 0	L.947 18 4	L.1083 6 8
Add produce of stock on 200 acres, varying in each column ⅛th part from standard produce, at L.2 per acre,	266 13 4	333 6 8	400 0 0	466 13 4	533 6 8
Total produce of Stock and Grain,	L.808 6 8	L.1010 8 4	L.1212 10 0	L.1414 11 8	L.1616 13 4
Deduct total expenses, viz.—Rent of 400 acres, at 30s. per acre in standard column, which varies in the other columns by 6s. 3d. in the pound, the same nearly as the collective average prices of grain vary,	@17/6 L.350 0 0	@23/9 L.475 0 0	@30/ L.600 0 0	@36/3 L.725 0 0	@42/6 L.850 0 0
Expenses of labour, rates, bills, varying in each column ⅛th part from the standard amount,	⅛ lower 337 10 0	⅛ lower 393 15 0	Standard expenses. 450 0 0	⅛ higher 506 5 0	⅛ higher 562 10 0
From total produce deduct these total expenses,	L.687 10 0	L.868 15 0	L.1050 0 0	L.1231 5 0	L.1412 10 0
These are the tenant's profits after my system,	L.120 16 8	L.141 13 4	L.162 10 0	L.183 6 8	L.204 3 4
And these are the tenant's profits after the present system,	Loss L.9 3 4	Profits L.76 13 4	L.162 10 0	L.308 6 8	L.454 3 4
As a Commutation for Tithes, I propose one-fifth of the real rent in each column, viz.	L.70 0 0	L.95 0 0	L.120 0 0	L.145 0 0	L.170 0 0
And a tithe of the whole produce would be,	L.80 16 8	L.101 0 10	L.121 5 0	L.141 9 2	L.161 13 4

So that one-fifth of the real rent is not very dissimilar to a tithe of the produce, and especially if we consider the expenses of collecting, stacking, thrashing, and carrying to market, &c. it is quite near enough, if we calculate upon the variableness of the seasons for the produce.

The above are the results of my system of taking rents and tithes; and if the two systems were compared together, the advantages and benefits that my plan comprise are great and many, and which must be apparent to all. The first table shews that the present system of paying fixed rents has now become most barbarous, and most ruinous to the tenantry, and prejudicial to the interests of agriculture. In the increase in the price of grain, landlords do not obtain their just rent. In the decrease thereof, if they do not reduce their rents one-half, their tenantry are ruined. If my system had been adopted during the last seventeen years, it would have preserved our tenantry from insolvency, and our farms from ruin. Landlords would have obtained just and equitable rents annually, according to the varying average price of grain in the market, and which I think in amount would have been more than would have been obtained, in various annual sums.

My plan for a commutation of tithes, I also think a very just and a very practicable one. It would give the clergy their just right, without crippling the prosperity of agriculture, and without oppressing the tenant. It would be at the option of the tenant to redeem them or not at a just and fair value; and it would not be of any signification to him whether he paid the same one-fifth as tithe to the clergyman, or as rent to the landlord. My system has this farther advantage, that it is free from any of those objections that have been started against the present commutation and composition laws. Situated as this country now is, with regard to the necessity of growing its agricultural produce at the lowest rate; situated as it also is with respect to the heavy burdens that are daily increasing upon the land, I think that it cannot be long before some such measures as those I have proposed will be found absolutely necessary for the prosperity of the kingdom. All the corn laws in the universe will be of no benefit without them.

And now, having presented my measures to revise the present bad system of parochial economy, of rents and of tithes in England, I take my leave, hoping that these proposed important changes will be taken into serious consideration by those who are best enabled to put them into immediate execution.

DESCRIPTION OF THE DAIRY AT ALNWICK CASTLE.

(*To the Editor of the Quarterly Journal of Agriculture.*)

HAVING, a short time ago, visited Alnwick Castle, the princely mansion of the Duke of Northumberland, in Northumberland, I was particularly struck with the beauty of the dairy.

The cow-houses and dairy are beautifully situated at some distance below the castle, near the bank of the river Alne, which flows in a canal-like stream, ornamented with swans, through the extensive domain, amid fine shrubberies and delightful pleasure-grounds. The cows are mostly of the Ayrshire breed, though there are some Short-horn and cross bred cows. The object of the dairy being only to produce the best milk and butter, the cows are not selected for the purpose of improving the breed of the country, which, it is pleasing to observe, has perhaps already attained the highest degree of perfection of which it is capable. The cow-houses are commodious and airy. Each cow has a separate stall and manger, and every thing in regard to food and management is conducted with the greatest cleanliness and comfort to the animals. But the great object of attraction is the milk-house. It consists of an oblong building standing apart, surrounded with a deep viranda, through which no sunshine can penetrate. The floor of the viranda is laid with different coloured round pebbles brought from the sea-shore. The light columns of wood which support its roof are festooned with clematis, honeysuckle, jasmine, passion-flower, and other climbing plants. The single apartment in which the milk is kept is about 30 feet in length, 20 feet in breadth, and 14 feet in height. It has two doors and four windows, the sill of the latter being about 4 feet above the floor. The floor is laid in an elegant tesselated form with bricks. The walls are covered with white glazed square Dutch tiles. The roof is of plaster, with a handsome cornice. A thin white marble slab as a broad shelving runs round the whole chamber as high as the sill of the windows; but the middle of the floor is occupied by a very large and thick white marble table, raised about two feet above the floor, independently of its own thickness, and leaving a commodious passage between it and the marble shelving. The dishes of new milk

are set upon the centre slab of marble. The dishes themselves consist of the finest Wedgwood ware. They are large, of a semi-ellipsoidal shape, having one extremity of the edge in the line of the conjugate axis, turned over in the shape of a lip, over which the milk is easily poured out of them. Large vases, and elongated jars of coloured china, are placed as ornaments on the marble shelving round the walls.

The shining pearly lustre of the tiles on the wall, the icy cold look of the white marble, the glossy splendour of the Wedgwood ware, and the brightness of the panes in the windows, all unite to impress the spectator with the conviction that no other union of earthly materials could so well express the idea of continued cold, with unsoilable cleanliness and perfect dryness,—the essential properties of a milk-house. The very air in the chamber, in its coolness and transparency, associated charmingly with the purity of the milk. The hand of taste was conspicuous in the arrangement of the materials. There was much that was of a white colour, and pure as it always was in every hue as reflected from the wall, the marble, the dishes, and the milk, these snowy hues were harmonized by the light of the sun passing through the greenness and freshness of the plants around the viranda; while the warm colours of the floor and of the rich patterns on the china jars, relieved the whole scene from monotony. In short, this apartment was the most delightful thing of the kind I ever saw. Its sweetness and beauty derived from its fitness of purpose are indescribable.

It is not neeessary here to enter into the dairy economy. Suffice it to say, that both the milk and butter from this dairy have acquired a high character, of which the public have at times opportunities of judging; for when the noble family are absent from Alnwick, the produce of the dairy is permitted to be sold in the public market, where it is bought up with avidity.

There is a simple instrument used here for measuring the relative quantities of cream which the milk of different cows, at the different seasons of the year, affords. It consists of a stand of mahogany, supporting a number of glass tubes of equal length and diameter, graduated into degrees. New milk from different cows is poured in equal quantity into each tube, and the graduated scale marks the number of degrees the thickness of cream occupies in each tube. J. N.

ON THE CULTIVATION OF FLAX IN HOLLAND AND IN SCOTLAND. *By Mr WILLIAM AITON, Hamilton.*

(Communicated by the Board of Trustees on the Fisheries and Manufactures of Scotland.)

THE Board of Trustees on the Fisheries and Manufactures of Scotland having requested me, when travelling through the Netherlands, to turn my attention to the culture and preparation of flax in that country, I traversed the lint-growing districts of Scotland, in order to prepare myself to make inquiries on the subject when abroad. I conversed with the farmers who raise flax, the merchants who deal in it, and with many mechanics who prepare it for the market. I set out for the Continent in April, and returned home in July 1832, after having travelled through the north of France as far as Paris, and through the principal towns and districts of Belgium and Holland, as far north as the Texel. The following remarks contain the result of my observations on the culture and preparation of flax in these countries, as contrasted with those as practised in Scotland.

Soil.—The soil to which the cultivators of flax in Flanders, and in the northern parts of France, give a preference, is a deep loam, or what they call fat land, adapted to the growth of wheat, which is generally the immediately preceding crop to flax. Some of them prefer a clay loam, and others think a sandy loam is best. I am of opinion that either of these soils, if in ordinary good condition, and free of couch and other weeds, is well adapted to the growth of flax, provided that the soil is neither too dry and sandy, nor too wet and spongy. A soil that does not too readily part with moisture, and yet is free of stagnant water, is certainly best for flax. A soil composed of strong clay, on a retentive subsoil, is too damp in wet weather, and too hard for flax in times of drought; and a dry sandy or gravelly soil over a permeable subsoil, does not suit a flax crop, as it requires more moisture than ordinary grain crops.

In Holland, flax is raised on every variety of soil which that

country affords; but the greatest part of the soil there is loamy or meadow-land, composed of sea-sand, mixed with black mould or sediment, resembling a mossy substance; and flax grows well on that species of soil. On land situated north of Rotterdam, termed "*droog maakery*," or land made dry, and where the soil is very rich, the flax is excellent in dry seasons, but lost when the weather happens to be wet. The strongest clay that I saw in Holland, was a few miles north from Breda, and the flax on it did not appear to advantage, owing in part to the land being full of weeds and slovenly farmed. Between Dort and Rotterdam, and in some other districts, where the soil is chiefly sand, mixed with black mud or sediment, but situated so low as not readily to become too dry, the flax I saw growing was excellent, and that of last year's crop, which I saw in various stages of manufacture, part of it watered, and part ready to be put in steep, was also of the very best quality. But in very rainy seasons, the flax on such land is apt to lodge.

In Scotland the greatest number of the growers of lint prefer ground of the nature of clay-loam, or clay-land that has been partly enriched with manure, and is not very stubborn and adhesive; for strong clay is apt to become too dry for flax in time of drought. Flax of good quality has sometimes been raised on haugh-land, near to rivers, but when such land has been too rich, the flax has sometimes lodged, and been of small value. And the general opinion is, that flax should not be sown on land that is too wet, or too dry, nor on that which is either very rich or very poor. Good flax has often been raised on loamy mossy ground, when not too rich. In the parishes of Monkland, Shotts, Slamanan, and others in the flax growing districts of Scotland, much good flax has been raised, on land where the upper stratum is black mossy earth, or what farmers call "grey land," and where the lower part of the soil is clay, resting on a tilly or retentive subsoil. Crops of flax of considerable value, have often been reaped from land of that quality, when the same land yielded oats of inferior quality. Moor-land of a clayey bottom, and having much mossy earth on its surface, and which would not yield more than five bolls of oats per acre, has often yielded, when the season was favourable, from twenty to forty stones of flax per acre.

Situation.—Flax will grow to advantage at the height of 700 feet above the level of the sea, provided the soil and other circumstances be favourable. But it should never be sown on ground that is liable to be flooded, nor in small enclosures, that are surrounded with plantations or high hedges, as these intercept the free circulation of air, and induce mildews.

Preparation.—In Belgium flax is frequently sown after a wheat crop, and it has been found to grow well after a previous crop of madder. But in Holland, where much of the land is too low for wheat, and where madder is not a common crop, flax is sometimes taken as a first crop, when the land is broken up from pasture; and in that case it is sown early. But it more frequently follows a crop of oats, and is ten days or two weeks later in being sown than when on lea-ground. In all sorts of ground, and in every country, flax does best on newly broken up land, if meliorated by ploughing and some manure, than upon any other land of similar quality. And it never does well when too often repeated on the same ground, or where the soil has been exhausted by over-cropping.

It has often been observed, "that land designed for flax should possess nearly the texture and firmness, the depth and degree of moisture, suitable to good wheat land, the fertility of our best lands, the cleanness of fallow, and the surface of the best barley ground." It would certainly be desirable that all land were brought to that state of improvement. But in Scotland it has been found, that excellent crops of flax are raised with all the certainty attending that species of crop, on land of a medium or rather inferior quality,—land that is neither rich nor very poor. On rich land the flax is in danger of lodging, or of growing too rank and coarse; and if the soil be very sterile, or when a good soil has been over-cropped, and is foul with weeds, a crop of flax cannot be raised with good effect.

There is more danger of land being too rich for flax than of its being too poor: for much of the land in Scotland, on which flax is now raised, on any thing like an extended scale, is far from being rich. Much of it in the lint districts of Lanarkshire is a mixture of black mould, or dead mossy earth, that has accumulated over a sterile clay soil, that has never been much enriched by manure or improved culture. And however unac-

countable it may be, it has been well attested to me, by many intelligent farmers in the flax-raising districts, and by people who have had much experience in raising flax, that they had excellent crops of it, on bare hard land, of a medium or inferior quality, while that land was kept under the old regimen, of crooked ridges, and never fallowed. But when the lands came to be fallowed, the ridges straighted, enriched by manure, and wheat, clover, and other improved crops taken, the lint crops were so far inferior, that they had been given up as unprofitable.

It has been justly remarked, in the directions circulated by the Board, p. 3, That "ground that has been laid down clean and in good order, and pastured for some years, after being broken up, and carried one crop of oats, will seldom fail to yield a good crop of flax. If the soil be of the best kind, and very rich, a crop of barley may succeed the oats before the flax is sown*. If the soil be clay, and has not been laid down in the best order, lime should be applied to the sward, one year at least before it be broken up; then oats for the first crop, barley or peas, or drilled beans, well manured with good old dung, for the second, after which sow flax."

As to the crops that ought to precede flax, public opinion seems a good deal divided. In Belgium, *wheat* and *madder* are preferred to all other crops, as the precursors of flax; and nearly the same opinion seems to prevail in Holland, as to wheat, where it can be sown. *Potatoes* and *turnips* have been recommended by writers on agriculture, as preceding crops to flax; and it has long been customary for farmers to sow flax after potatoes. From the land being enriched and cleaned by the potatoes, it might be expected, *à priori*, that no other crop could better prepare the land for flax. But in the lint district of Scotland, though some still follow that course as to potatoes, yet many of the most intelligent farmers disapprove of sowing flax after them: all of them reprobate sowing flax after a turnip crop; and that opinion seems to be supported by the experience of many intelligent farmers.

Peas are mentioned by the farmers in the lint districts as a

* This may be good farming on this kind of soil, for raising a crop of flax; but it is undoubtedly bad farming for any kind of land.—Ed.

proper forerunner to flax, though some of them say that the soil is apt to swell after peas. *Beans* have been recommended as a proper crop before flax; but grubs have been found to injure the lint, when it followed a bean crop. Probably some of the failures in the flax crops that have led to these opinions, may have proceeded from other causes; but the concurring testimonies of intelligent farmers ought not to be overlooked. Some writers have proposed flax as a first crop after pasture; and others have recommended to give the land that was intended for flax a winter ploughing, and a second furrow in the spring, before the flax was sown; while others talk of destroying weeds by repeated harrowings at some distance of time from each other, before sowing. But the lint-growing farmers in Scotland scarcely ever sow flax as a first crop, after the land has been broken up from lea. A winter and spring ploughing may be given in Belgium, where the climate is so fine, that the farmers can sow their crops either early or late, as they find it to be convenient; where it is common to be planting potatoes on one ridge, when they are ready to be hoed on the ridge adjoining; and the same with other crops. But in Scotland, these operations would throw the sowing of the flax too late; and a second furrow would open up the soil so much, that the drought would hurt the lint.

Land that has been exhausted by over-cropping, and become foul, is unfit for a flax crop, till the ground be cleaned, either by long rest, or by a course of fallow; and it certainly should not be sown after a turnip-crop.

The most common preparation for flax in Scotland, and, indeed, the best that has yet been discovered, is to sow oats as a lea crop, and flax as the second crop. If the land is very rich, two crops may be taken; say beans as the first, oats for the second, and flax for a third crop; or, if the ground is not in danger of becoming foul, oats for the first crop, beans the second, and oats for the third, to be followed with flax. And if the land is very poor, it may be manured on the sward, so as to secure a good crop of oats, and give a fair chance of good flax the crop after oats.

In all cases, and in every species of soil, land intended for flax ought to be ploughed about the end of January, or early

in the month of February, that it may more readily retain a due proportion of moisture, so necessary for the growth of flax. If ploughed too early, the soil is injured by the winter rains, and soured into mortar, if a clay soil; and the weeds will more readily gain a footing than when the ground is not ploughed so early. And when the ground is too late in being ploughed, or when it gets a second furrow in the spring, it is too much opened to the drought, and cannot retain through the summer that portion of moisture that a flax-crop requires. Another objection to giving the land a second furrow in the spring (for it cannot be done till the ground is dry), is, that it turns up the weeds, which have not had time to rot, and brings the seeds of weeds to the surface, where they grow more readily than when turned down under the furrow-slice.

The only other preparation for the seed, is to harrow the land well with ordinary iron-harrows, so as to bring to the surface any couch weeds that can be come at, and which, with stones, and every incumbrance, ought to be removed. Grass-harrows, or those having short teeth, if they are at hand, may be used in covering in the seed, after it is sown; but ordinary harrows ought to be used in smoothing the ground for the seed, and they may do to cover it also, if no other are kept on the farm. If the soil is open and dry, it should be rolled; but not, if the land is firm, and a heavy soil, or when the ground is damp at the time.

On the choice of Seed.—The choice of proper seed is a matter of considerable importance in the cultivation of flax, as some seed suits one soil, and some another, better than any other seed. All seed should be carefully examined as to its quality, and none sown that is in the least degree deficient; and great pains should be taken never to sow flax-seed on the same sort of soil as that on which it grew. If it grew on a clay-soil, it should be sown next year on sandy or mossy land. On that account, it would be desirable to raise the seed at home, that it might be known on what soil it grew, and put on a different soil next year. The advantage of a change of soil is lost when foreign seed is sown, as vast quantities of it is thrown together in stores, and in ships, without the least regard to whether it

has been raised on a sandy, clayey, or mossy soil. Any advantage, therefore, that we derive from foreign seed, must be from its superior quality; unless we suppose that a change of climate is beneficial, which is a doubtful point. There can be no doubt, however, as to the change of soil being beneficial, not only to flax, but to oats, potatoes, and every species of crop. There seems, however, to be something remarkable in this respect as to wheat; for, when the seed is carried from a southern climate to a country farther north, it grows well; but when that which has been raised in Scotland is sown on the shores of the Mediterranean Sea, it grows luxuriant in stem and foliage, but produces little grain. All such matters, though they may seem of small importance, or unaccountable, ought to be made known, and attended to.

The Dutch, although they raise and export much flax-seed, also bring much of what they sow from Riga, as they find it a profitable change of seed. Riga seed, when sown in Holland, generally grows coarse, and yields a bulky crop the first year. It is always sown a second year, and the seed it then yields is not sold by the Dutch, but kept for their own use, as it produces the best and finest flax. The seed of the second year's growth from Riga, is called *Riga-kind* (or Riga-offspring) by the Dutch boors, which they hold to be of double value to the seed of the third crop, which they export. In order to serve themselves with seed of the best quality, many of the growers of flax in Holland sow a small quantity of Riga seed every year, in order to get as much Riga-kind, or seed of the second year's growth, for their own use. None of them sow the seed produced by the third crop, but send it to the foreign markets. I am not aware that the growers of flax in Scotland have ever attended to the distinction of the seed of second year's growth from Riga seed, or have ever made the experiment to ascertain if its superiority is equal in Scotland to what it is understood to be in Holland: but surely the matter ought to be investigated; and if similar results are obtained here, the plan of raising seed of second year's growth, from Riga seed, may be pursued here as well as in Holland.

The growers of flax in Holland never sow any foreign seed, except that from Riga; but in Scotland, flax-seed from Hol-

land, and various parts of America, as well as that from Riga, is sown. Some have offered directions for sowing the seeds of particular countries, on soils of certain qualities; as Riga seed on a clay-soil or on clay loam, and American seed on a damp soil. Others argue, on apparently better grounds, that, as the Dutch seed is raised on deep loamy ground, far from being dry, it ought to be sown here on ground of a different quality; and so on with all other seeds. But it is impossible to ascertain on what species of soil any seed in the market has grown, except the Dutch seed, where they have only one description of soil to sow their flax upon. And it is probably owing to that circumstance that the seed of the third crop is so far inferior to that of the second growth from Riga seed.

I am decidedly of opinion, that our growers of flax might easily raise at home a considerable portion of the seed they need, instead of using so much of that from other countries, some of which is the refuse of the market. The sagacious Dutchmen have found out a species of seed for their own use, that is of twice the value to them of the seed they send over to us; and if our farmers were at due pains, they might either raise the best seed for themselves, or find out how the seed of one crop was in Holland of double the value of that of next crop, from the same seed; and raise what was found to be most valuable. If the inferiority of the third year's growth, in Holland, proceeded merely from its being sown too often on the same species of soil (for they have but one soil in the greatest part of Holland), it would show the necessity of attending more than we do in Scotland to the change of soil, and, of course, to the raising of their flax-seed at home,—as otherwise they cannot know on what species of soil it has been raised. Our soil and climate are as favourable as any other for raising flax-seed of good quality, provided we were as careful as the Dutch are, to sow our flax thicker on the ground, that none of it should send out branches, bearing capsules of inferior growth, and that do not ripen so soon as the seeds on the principal stem; and that the seeds may be allowed to become ripe, and be dried on the stems: For it is not possible to dry the seed rightly any other way, or even to keep it so well, if it is removed from the capsules.

The quality of seed is easily ascertained, and it is of great importance that every farmer should know the marks of good seed, from that which is of bad quality. "Flax seed, that is fresh and proper for sowing, should be smooth, slippery, bright, plump, and so heavy as to sink in water. It should taste sweet, and being broken, it should appear of a light yellowish-green colour, and oily. The weight of flax seed, when good, is about twenty-one lb. avoirdupois per peck, Linlithgow measure." * These directions are sufficient; but, if any doubt still remains, the seed may be tried, in a few days at any time, in a hot bed, or by putting it into a small quantity of moist earth, and, by counting the seeds so tried, it will be easy to see how many of them vegetate, and how many die. All seeds that crack and blaze when laid upon a hot iron, will be found to be sound, and *vice versa.*

In order to raise flax seed of good quality, the flax should be sown so thick on the ground, that none of it send out branches, or have many capsules on one stem. It should not be pulled till the seeds are ripe, the bolls or capsules have become yellow, and the leaves or foliage have withered, and begun to drop from the stems. And that is the proper time for the lint to be pulled also, provided it has not grown too coarse, and too thin on the ground.

But the greatest defect in our home grown seed arises from the slovenly manner in which it is separated from the stems of the flax, and dried. In Holland the seed is dried on the sheaves the same as wheat or corn, and it seems scarcely possible to dry the seed properly any other way. But, in Scotland, the seed is taken off when the lint is pulled and damp; and then it becomes impossible to dry any great quantity of it, without injuring the seed. When the bolls or capsules are taken off before being dried, they will be injured by remaining a single night in a heap. The best clay floor is too damp for drying them, and even on a wooden floor they will be hurt, if they are not spread very thin, and get abundance of air for several weeks, till completely dried. Indeed, the only safe way of drying lint-seed is on the stems, as is done in France, Belgium, and Holland.

* Directions of the Board of Trustees, p. 8.

Good sound seed, if well preserved, *may* be sown the second year after its growth, though it will be about two weeks longer in growing than seed that has not been kept over a year. It should never be sown till its quality is carefully subjected to the most rigid scrutiny; and it is probably not prudent to sow it, if other seed can be found.

Sowing Flax-seed.—The exact period for sowing flax cannot be regulated by the kalendar, but must be fixed by the state of the weather. It must not be sown till the ground is properly dried, for sowing and harrowing in other crops; and not sooner than the last week of March, and, if possible, not after the 12th or 15th April. The mode of sowing it is broadcast, and well understood. The land is harrowed till it is smooth, and clods and weeds removed before the seed is committed to the ground.

The quantity of seed sown by the most intelligent growers of lint in Scotland is from six and a half to seven and a half pecks of Linlithgow barley measure per Scots acre; or where the land is rich, the seed gross, or the surface of the ground coarse, eight pecks are sometimes sown on each acre.* In Holland, the quantity of seed sown was stated to me to be from three to four English quarters, which cost about three pounds Sterling to each *morgen* of land, which, from the best calculation I could make, when assisted by Mr Smith, an intelligent merchant, who has resided many years in Holland, seemed to correspond nearly with the quantity of seed sown in Scotland, or rather more than less. And, from having examined very many fields of growing flax there and in Brabant, I am confident that it grew thicker on the ground in these countries than the generality of flax grows in Scotland. How far this proceeded from the seed being better, or from being sown thicker, is not easy to determine. This has the effect of making the flax grow finer, and more slender than when sown too thin.

Grass-seeds are sometimes sown at the same time, and harrowed in with the flax-seeds. The grass should rather be sown

* Or about two bushels and one-half peck imperial, per imperial acre.—EDITOR.

at a later period, say when the flax is weeded, and the weeders creeping on the ground will effectually cover them in. If these seeds are sown on the same day with the flax, they should not be mixed into the same sheet with it, as the smallness and weight of the flax-seed and clover would make them sink, and the sower would find his hand sometimes filled with the one seed more than the other. And if there was the least breeze of wind at the time, it would carry the grass-seeds to leeward, while the other seed would not fall on the same part of the ridge.

Weeding Flax.—Every prudent farmer will avoid sowing flax on land, with roots of couch grass, or other weeds that have roots or stolons spreading in or over the soil; as these cannot be torn out, without injuring the flax. There is little difficulty, however, in pulling out the ordinary weeds of annual growth, and which ought to be done with great care. Where annual weeds abound, the expense of pulling them ought not to be grudged, as the ground cannot be so cheaply and effectually relieved of them in any other way. Hand-weeding is not so expensive as a course of summer fallow. All sorts of crops are carefully hand-weeded in Holland, Belgium, and France; and this is the greatest superiority that the farmers in these countries display over their brethren in Britain. From the month of April to the end of June, you may see groups of people, of both sexes and of every age, able to pull weeds, lying or standing on one species of crop or another, either hand-weeding or hoeing with the greatest care; and when the wheat, or other crops, are any where too thick, they pull up part of the stems along with the weeds; and every plant they pull is carried home to the farm-house, and boiled with chaff, cut straw, &c., and served up to the cows, in the form of soup. Their cows are mostly fed in their byres all the year round. Such industry in weeding their crops is worthy of imitation.

Flax should be weeded when the stems are about two inches above the surface, that the crop may not be injured by the weeders lying upon it. If the flax is four inches long when weeded, it will be bent by the weeders creeping over it; and, if so, it

grows crooked, and is always broken at the bent places whe scutched in the mill.

Pulling Flax.—It is of considerable importance to ascertai the proper time for pulling flax. For if it is taken up too soo the lint is soft and weak, and the seed unfit to be sown; and it remains too long in the ground, the lint becomes dry, hard coarse, and of a bad colour. In Belgium, and particularly i Holland, where the seed is an article of considerable value, th flax is never pulled till the seed is completely ripe, and the boll or capsules have acquired a brown colour, and become firm an hard, their points so sharp, as to fix themselves in the skin o the hand that presses them; and until nearly all the leaves o foliage have fallen from the stems, or become yellow, and begu to wither. But, in Scotland, where the seed is too little re garded, the flax is pulled, whenever the stems become a litt yellow, and the leaves have fallen from the lower part of th plants. The flax growers in both countries are tenacious, eac of their own mode of management, and probably both are i far right.

It has been mentioned, that the Scots flax does not grow i close and thick on the ground, but rises rather coarser an stronger than the continental flax; and that the former h more branches with seeds than the latter. The Scots flax, f these reasons, must be coarser in the stem, and stronger tha the Dutch flax; and, therefore, the Scots flax requires to b pulled rather sooner, to prevent it from becoming still mo coarse, dried, and harsh. But the continental flax has great the advantage of ours, in so far as regards seeding. For wh flax is sown thin, it grows strong and branchy, with a great number of capsules, the seeds of which do not ripen equall Whereas that in Holland growing closer on the ground, do not send out branches, or many seed-lobes; and as it grow more delicately, it requires to ripen more than the other, order to give it proper strength.

Flax should never be pulled when it is in the least degr damp, as in that case, the bark or lint is much injured by bei rubbed and handled in pulling. If any part of the crop sh appear to fall do and lodge before it is ripe, it should

immediately pulled, and kept by itself, as it cannot have strength to stand the operations of bruising and scutching, along with the other flax. Every part of the field should be pulled when it becomes ripe; and no flax should be pulled till it is completely ripe. If the lint on the crowns of any of the ridges shall ripen before that towards the furrows, the ripe should be taken up, and the green allowed to stand till it becomes ripe.

The greatest care should be taken, when pulling, to sort the flax, so as to keep that of every kind and quality by itself—the long and coarse in sheaves by themselves—the fine, the short, and every different kind separated from each other; so that every sort may be managed and dressed, as they severally require, and put to the uses for which they are best adapted.

In Holland and Belgium, the flax, when pulled, is tied up in small beats or sheaves, such as a man can grasp round with both hands, and then set up for about two weeks to dry like grain crops in stooks, the root end on the ground projecting, so as to make the sheaves lean upon and support each other, and that the tops may be exposed to the air to dry. When dried the flax is secured in barns, on the joisting of the farm-houses, or in stacks that are well thatched.

In Scotland, some of the farmers lay the flax in handfuls on the ground till it is rippled and bound up in sheaves, to be put in steep. Others put it in sheaf when pulled, and set it up in stooks, merely till it be convenient to put it in steep. Some, when they set up the stooks, place the top-end of the sheaves on the ground, and the roots of the lint uppermost; a practice for which no reason can be assigned, farther than that the tops, being heavy and broad, the stooks are not easily overturned by wind.

Rippling and Saving Seed.—The seed of flax is always taken off on the Continent, and preserved, either to be sown, or to be bruised for oil, or given to cattle; and it betrays great want of industry to do otherwise in any country. The seed of flax may not always answer to be sown in Scotland, nor can the whole of it be wanted for seed; but it is too valuable for the oil it contains, and as food for cattle, to allow any part of it to be lost. It is of great value, both as food and as medicine, for

cattle, and particularly for horses. From the extraordinary labour performed by cart and road horses, and the high feeding they require, they are often subjected to inflammation in their blood and intestines, by which much property is lost. But if the proprietors of horses could be induced to give each of them a single handful of linseed daily, or occasionally, boiled with beans or other food, it would operate as an antidote or a cure to those inflammations by which so many horses are lost. But, instead of this, the Scotch farmers throw away their flax-seed in the water in which they steep their lint, where it serves to poison the fishes, and render the water and the air unwholesome, as well as to injure the flax.

The only sure way that flax-seed can be preserved to be sown, is to dry it on the lint on which it grows, as is generally done on the Continent. It ought to be set up to dry in stooks, like grain crops, for at least two weeks, and either put into barns, or stacked for a time, till the seed is well dried on the flax, even when it is either to be bruised for oil, or given to cattle; and that which is to be sown should not be taken off till the month of January at soonest. That is the course followed in France, Belgium, and Holland, where I saw, in the month of May, many stooks of the crop of the preceding year's growth; and I saw the people in the vicinity of Valenciennes, and St Amand, carting some of their flax to the ponds to be put in steep.

The seed, when once properly dried on the flax, may be removed by rippling, or by thrashing, or beating it; always taking care not to rub or hurt the flax when removing the seed. When once the flax and the seed have been dried together, the flax is not so easily hurt as when it is green and damp; still, it should not be rubbed or handled roughly, as the lint is easily hurt by handling.

Some have objected to the method of drying the flax before it is steeped, as they say that it makes the lint coarse and harsh, more difficult to be watered, and longer kept from the market. The two first of these objections are obviated by the superior quality of the Continental flax to ours, though it is all dried in Holland, Belgium, &c. before it is put in steep. And, except

when the seed is to be sown, it may be removed, so as to get the lint steeped before winter sets in.

Watering or Steeping.—This is certainly the most critical, and one of the most interesting, operations in preparing flax for the market; and the value of the lint, and the profit it yields, depend more upon the right mode of watering it, than upon any thing else the grower of flax has to perform. The Dutch, and some others who grow flax, enjoy advantages with respect to watering it, that those who grow that species of crop in Scotland are deprived of. The numerous small canals, or fosses, by which the different farms or possessions are divided and subdivided, and which serve as fences to the different enclosures, are remarkably well adapted to the watering of flax; and it is to these fosses, more than to any other circumstance, that the superior quality of the Dutch flax is to be imputed. These ditch canals or fences receive the rain-water from the surface of the land which they intersect, and being always open to the sun and weather, and so shallow that the water is warmed, and any injurious quality it contains drawn off, they are well adapted to the watering of flax.

The mode of watering flax in Holland, and in the low-lying lands in Belgium and France, is to put a dam across the canal, clean out the weeds and mud for a few yards next the dam, lay in three or four rows of sheaves of flax next the dam, packing the sheaves close together, with the root-end towards the bottom of the canal, and the top-end leaning the first course on the dam, and each succeeding row on the one before it; and then covering these about six inches deep with the rank herbage that grows in the canal, and the mud raked up from its bottom. A few more courses of sheaves are next placed in the same way as the first, and covered in the same way with weeds and mud, and in this way they pack in more flax, and cover it till the whole is put in steep.

These fosses, and the mode of placing the flax in them, are as they ought to be; but the propriety of dragging up so much mud or slime from the bottom of the canals, to cover the sheaves six inches deep, may well be doubted. That mud will no doubt cover the flax from the rays of the sun, which is proper

to be done, and it will keep the lint from floating; but so much mud laid over the sheaves, and that raised in the canal by raking it up to be laid over the flax, cannot fail to besmear the lint so much, and render it so nasty, that it would require to be much rinsed and washed in the water to remove the mud. This not only creates labour, by no means the most agreeable, but it must greatly injure the lint by ruffling it in the water, a thing that ought to be avoided. When flax is handled roughly, while it is soft and wet, even before it is put in steep, the rind, or lint, is readily injured; and it must be still worse when it is handled at the time it is taken from the pond. And if the mud is not washed off the lint before it is dried, it must hurt its colour, and render it musty when scutching, and even when it is heckled and spun.

With due submission to the sagacious and industrious Dutchmen, I would recommend to them, and to all growers of flax, to steep it in water that is as free as possible of mud or filth, so that the lint may neither be rendered foul nor have to be rinsed in water, to the injury of the flax. It is proper to cover the flax when in steep, but that ought to be done with something not so nasty as mud. The reeds, bulrushes, and other coarse herbage to be found on the verges of all their canals, ought to be used in covering the flax when in steep rather than mud. In other respects, I was much pleased with the mode of watering flax which I found practised on the Continent.

In Scotland, the watering of flax is often performed in a careless and improper manner, partly owing to the difficulty of procuring proper water, and partly from want of proper attention in conducting that process. It is generally steeped in rivers, brooks, or small streams, that can be come at with least labour or expense; or in trenches that are supplied by such streams, without due inquiry being made as to the quality of the water. Some farmers put their flax in steep in any pond they can find, frequently in some place from which minerals have been dug, and where the water is strongly impregnated with mineral qualities, and without inquiring whether the water is hard or soft. The qualities of the water ought to be well ascertained before flax is put into it, and particularly in Scotland, where minerals and mineral water so much abound, where few streams are al-

together free of hard water or mineral qualities, that impede the watering of the flax, render it harsh, or give it a bad colour.

Every farmer, or other grower of flax, should form a pond or trench of proper dimensions for watering the flax he raises, and take care that it be filled with water that is soft and free of every mineral tinge that can in the least injure the lint, or retard its watering. Having found such water, the trench should be dug in clay or other retentive soil, or, if otherwise, the bottom or sides of the pond or trench should be coated with earth, that it may retain the water. The trench should (if local circumstances permit) be from eight to ten feet wide, that a person on each side may put in and take out the sheaves with ease, and lay them on the bank; and it must be at least three feet and six inches deep, and longer or shorter as required. Some have made their ponds much deeper; but where that is done, the sun and air will not so readily neutralize the qualities that render the water hard, and when the flax is in steep, that at the bottom will not be so much acted upon as that which is uppermost, and of course the one-half will be sufficiently watered before the other. The notion of keeping the flax afloat in the pond is a mere fancy. If mud or other impurities have got into the pond, they should be carefully removed, and pure water let into the trench some weeks before the flax is put in steep, that the sun and air may freely act upon the water, and render it soft; and, on that account, the pond should not be shaded by trees. If possible, a small supply of water should be kept ready to be let into the pond when the flax is in steep, not to change the water, but to supply exhaustion.

Inattention to the quality of the water in which flax is steeped, has often been found to injure the lint to a considerable extent. Mr Gartshore, in Merryburgh Mill, Monkland parish, informed me, that having become joint proprietor with another person of a large field of flax, it was divided between them before being put in steep; that he placed his half of the lint in water he knew to be soft, and free of mineral qualities; but the other proprietor, from economical motives, steeped his half of the same flax in water of bad quality; and the consequences were, that his lint had to be sold 30 per cent. lower than that of

Mr Gartshore. In the same way, some of the Dutch boors, who rent land in Zealand for raising flax, have, to save the expense of removing it, steeped their flax in the water of that province, which is brackish, and which injured the colour of the lint so much, as to deteriorate its value considerably.

When flax is put in steep, the sheaves, of the girth that a man can grasp in both hands, and bound not too tightly, should be set on end, the roots to the bottom, and the tops uppermost, leaning a little forward. Some reverse the sheaves, from a mistaken notion that the root ends are most difficult to water; but, on due attention, it will be found that the root end, where the stem is hollow, is always easier to water than the top of the flax; and therefore the latter should be placed uppermost, where the sun has greatest influence.

When the flax has been packed into the water, it ought to be slightly covered over with wheat-straw, fern, rushes, or coarse herbage cut from ditches or plantations, merely to prevent the light of the sun from injuring and discolouring the flax. Turf has been recommended for that purpose, but it would bare too much sward to procure it, and it cannot be so clean as straw or coarse herbage, which being afterwards removed to the dung-stead, or dried for litter, would repay in manure the trouble of collecting it. Some stones or timber must be laid over the flax to keep it under water, for it is much disposed to float, when the fermentation is strong, about the third or fourth day after it is placed in the water.

If in sorting the flax, different dimensions or qualities are found, each of these ought to be kept by themselves in the water, and each of them watched and treated as they respectively require. If it shall be necessary to steep twice or oftener in the same pond, the water ought to be completely changed. Otherwise the juices of the first parcel will retard the watering of that put in afterwards, and will give it a bad colour.

No exact space of time can be fixed for the flax being drawn from the pond, as the heat or coldness of the weather, the softness or hardness of the water, and the quality of the flax, have powerful effects in expediting or retarding the period for watering. An intelligent Dutch boor informed me, that he had found flax sufficiently watered in five days, and he had seen it

ten days in steep without being injured. "But when the bubbles of air disappear from the surface of the water, and the flax seems to have settled to the bottom, it may then be concluded that the operation of watering is nearly finished." To avoid mistakes, however, on that important point, a few stalks ought to be drawn from the heart of a few sheaves, at different parts of the pond, and these carefully examined. Some of the stalks may be broken at about four inches distance, and if the heart of the stem can be easily drawn out of the bark or lint, then it is time to remove the flax from the pond. But if the lint still adheres to the boon or pith, it must be continued in the steep, till they are found to part freely. A small quantity of the flax may easily be dried and beaten and broken, to ascertain if it is ready to be taken out of steep. Great care on this critical point is necessary, as a single day, or even a few hours too long in steep, may render the lint soft, weak, and brittle; and if it is not properly watered, the lint is coarse, and cannot be separated from the boon. When properly watered, the stones or other covering is removed, and the flax taken up, and laid on the bank of the trench, with the ends of the sheaves a little elevated, that the water may run off, before the flax is removed to the field to dry.

In Holland and Belgium, the flax is spread out on nearly as much ground as that on which it grew. This is called "*grassing*," and when any of the boors have much flax, they have to pay considerable sums for grass land to spread their flax upon till it dry; and it must be an advantage to get such land near to where the flax is steeped, as the carting it far is not only expensive, but must injure the lint when it is much turned over and handled at the time it is wet and soft.

The lint boors consider it fortunate when the flax gets a heavy shower of rain, soon after being spread on the grass, and before it is dry, as the rain cleans the lint, and improves its colour. And whenever the flax gets dry after a shower, it is taken up, bound in sheaves as before, and after standing a few days in ricks, that it may be completely dried, it is stored in barns, on the joisting of the farm-houses, or in stacks, till it is beaten and scutched. The lint merchants complain, that the boors are too fond of bleaching their flax on the ground, in order to give

it a fair colour; but which the merchants say weakens the texture of the lint.

The same method of drying flax, after it has been watered, is practised by some lint growers in Britain; but by far the greatest number of them in Scotland set the sheaves up on end, which in the language of the district is called "*gaiting*." After the flax has lain a few hours on the bank of the pond, to let the water run off, and stiffen the sheaves, the bands are drawn up towards the tops of the sheaves, and each sheaf is set up by itself, the root end on the ground and well spread out, to make it stand, and admit air to dry the flax. After the sheaves have stood two, or not more than three, days, and dried on the outside, the sheaves are turned inside out, the flax loosened so as to let in the air, and being again bound softly they are set up as before, the root end spread out in a circular form, to make them stand; and they remain in that way till the flax is dry. They are next put up in small hand-ricks, for a few days, and afterwards put up in stacks and well covered.

Both these methods of drying flax have their advantages and disadvantages. By spreading the flax, it is speedily and regularly dried; the rain cleans it a little, and it can be taken up all equally dried and partly bleached. But the expense of grass land, the carting to it, and the labour of spreading and turning the lint, as some of them do, is much greater than when the flax is gaited. When gaited, the flax may be all set up within a few yards of the pond; the hire paid for grass land and carting is in a great measure saved; and the flax is not so much rubbed and hurt. But when set up in sheaves, the lint is not so well cleaned or bleached by the rain as when it is spread; and the inside of the sheaf, if the flax happens to be rather much watered, is not so soon dried as when spread.

It has been proposed by some, that when flax happens to be too soon drawn from the steep, the defect may be remedied, by allowing the lint to lie a day or two in a heap, on the side of the pond, before it is spread or gaited; and it has also been proposed to remedy the evil, by allowing the flax to lie spread on the field till it is well watered. These are probably the best [illegible] of correcting that mistake in watering imperfectly. But care ought to be taken to avoid the necessity of having

recourse to them. For when flax is laid in heaps at the time it is taken out of steep, the outside of the heap and both ends of the sheaves derive no benefit from lying in that state; and if insufficiently watered, the top end of the sheaves, which are worst to water, would derive no improvement by lying in a heap; and if the weather happens to be hot, the whole heap would soon heat, so as to injure the lint. If the evil is attempted to be remedied, by allowing the flax to lie spread on the ground, it would soon be hurt by rotting, and the herbage growing up through it. The merchants in Holland consider all flax of inferior value that has been exposed to the weather more than a very few days. The defect of imperfect watering can only be brought on by inattention; for it is as easy to ascertain before the flax is drawn from the steep if it is well watered, as it can be after it has been laid on the side of the pond, or when it has been spread. And as these remedies are at best but partial and injurious to the flax, it should be carefully watered before it is drawn from the steep.

Bruising and Scutching Flax.—These operations are performed so very differently in Holland and in Scotland, that the *modus operandi* in both countries requires to be detailed, and a few remarks made on each.

In Holland and Flanders the flax when dried after steeping is generally stored in barns, or in stacks that are well thatched, or on the joisting of houses over the cattle, till it be convenient to bruise and scutch it. If the flax has been stored in any dry place, it is sometimes bruised and scutched, without any previous preparation; but generally it is slightly heated and dried on kilns built for that purpose, before it is bruised. These kilns or drying houses are about fifteen feet long, and are built of brick, having a place for fuel about two feet and a half under the surface of the ground, so contrived as to send a gentle heat through the kiln, and yet to keep the fire from reaching the flax. The only fuel used is the refuse of flax, or what in Scotland is termed "*shoes*," by which the flax is heated and well dried before it is bruised; and one parcel after another is so dried as it is needed.

This seems to me to be a very necessary preparation that is

neglected in Scotland, to the injury of the flax, and loss to the owner. When flax is stacked in the open air in this damp climate, it cannot be so dry, or the boon or woody part of the stems break so well, or part so readily from the bark or lint, as when the stems, already rendered brittle by the watering, are well dried, before being bruised. Moderate drying of the flax seems to have a similar effect with drying of grain, before it is ground into meal. This might easily be done in Scotland on the corn-kilns, and the neglect of it is certainly injurious to the flax.

In Holland and Flanders, the operations of bruising and scutching the flax are both executed by hand-labour; but these are done by machinery in Scotland. The bruising apparatus on the Continent is very simple, and wrought by the hand. Four thin boards, about fifteen inches in length, and three inches broad, are fixed horizontally, with their edges uppermost, at about three inches distance from each other, and about thirty inches above the ground; and three similar boards of timber, of the same dimensions every way, are fixed to the other, on a hinge at the one end, so as they can be raised and sunk at pleasure, and each of the three falls in between two of the four under boards. The upper or moving half being raised, and a handful of the dry flax laid right across the four under boards, the three upper ones are forced down on the flax, and one of the three going in between each of the four boards, the flax is broken and crushed, and the operation repeated, and the flax turned over and over; the whole boon or woody part of the stems is broken and bruised, so as to be well prepared for being scutched with good effect. That handful is then twisted and laid aside, and another taken up to undergo a similar operation.

In Scotland, the bruising of flax was long performed with a hand-mallet, upon a smooth stone, and the flax bent and rubbed a little, to break the boon or woody stems, so as it might be separated from the flax by scutching. But when machinery came more into use, beaters were moved by the wheels of flax-mills; and soon after indented rollers were formed, to crush and break the flax still more completely. One roller, three feet dia-

meter, moves in the centre, and two other rollers, each of fourteen inches diameter, operate on the large one. All the three are indented at least two inches and a half deep; so that, when they are moved round, each of the concaves falls into the convex of the other roller, and the flax being spread thin, and the top end of it let in between the rollers, is carried round with them, and completely crushed and broken in going once round the large roller in the centre, which throws off the flax ready for the scutching.

Having paid attention to both modes of bruising, and seen them in operation, I am decidedly of opinion that the Scottish mode is much preferable to the Dutch, in performing the work far faster, and much better than that used on the Continent; not forgetting, however, that the Dutch mode of drying the flax before bruising, is a great improvement.

In Holland, Belgium, and such parts of the North of France as I traversed, flax is not scutched and cleaned in mills, or any species of machinery, but entirely by hand-labour. The whole process is of the most simple nature. The scutcher sits on a block of timber, about eighteen inches high, and having a board at his right hand, about the height of the arm of a chair, with a nitch or excavation, that a man's wrist would fill up; he takes up a handful of the bruised flax, twists the top end, and holding it in his left hand, he throws the root end over the nitch in the board, and with a thin piece of timber, about the size of a soup-plate, with a short handle, he scutches the flax, turning it over and over, with his left hand, and employing the scutcher with his right hand, till the one end is clean, and then he twists it, and operates on the top end, till it is also cleaned. And by repeated changings and scutchings, he makes the flax clean for the market.

This appears to me to be a soft and easy operation for the flax, compared with what it is subjected to in a Scottish lint-mill, to which I shall now advert. In Scotland, and I believe in England and in Ireland *, flax is scutched by machinery. A

* From what we have observed in the north of Ireland, flax is scutched by the hand, with an instrument like a short wooden sword, evidently too light for the purpose.—EDITOR.

water-wheel turns an upright shaft or spindle, on which four arms are fixed, each of them about seven feet ten inches long, and having wipers on each end; they are moved round horizontally, at the rate of two hundred times per minute; and as the flax is held in at holes or slits in the upper side of the box or frame, within which the arms move, each of them, or the wipers fixed on them, give the lint a blow or scutch every time they go round, or at the rate of 800 strokes per minute. The flax is thus exposed to a most severe beating, by which no small portion of it is broken down and lost.

These different modes of scutching flax are so far suited to the respective countries in which they are practised. On the Continent, where there are few waterfalls for turning machinery, and where such is scarce, the flax is scutched in a homely way. But in Scotland, where machinery abounds, and wages are high, recourse is had to mills for cleaning the flax. This no doubt saves much labour; but as the mills break down, and waste part of the flax, it seems doubtful if the mills are so profitable as some have imagined them to be. Our machinery certainly saves much hand labour, but it is at the expense of a considerable portion of the flax, which is saved by the more gentle way in which it is cleaned on the Continent. No flax is found among the refuse when the lint is scutched by the hand*; but in our flax-mills, a very considerable portion of lint is turned to waste.

Having thus stated every thing I have been able to discover, either on the Continent or in Scotland, that seems interesting, compared the practice of both countries, and offered such remarks as the subject treated of seemed to suggest, I shall merely say farther, that although the soil and climate in Holland, Belgium and France, are more favourable than ours to the growth and maturation of all sorts of crops, yet the climate and soil of Scotland are also propitious to the growth of flax, to all the extent we need, or can manufacture, and get sold.

If from twenty to thirty stones of flax, country weight, can

* In Ireland there is much waste, though flax is scutched by the hand.—

be raised per Scottish acre, on the inferior lands in the parishes of Shotts, Slamanan, the Monklands, &c. where not more than from five to six bolls of oats can be reaped *, surely equal or superior crops of flax might be raised on land that is richer and in a lower altitude. But taking these as an example, the return in flax is far more profitable than any crop of oats that could be reaped from the same soil. Flax sold some years ago at from 20s. to 25s. per stone; and it generally brings nearly the half of these prices, which amounts to nearly three times the price of five or six bolls of oats growing in these high situations. The expense of the seed, watering, and cleaning the flax, is no doubt greater than the seed and manufacture of a crop of oats; but by no means three times that expense. And if our farmers could be persuaded to raise the greatest part of our own seed, and follow the modes of culture and preparing their flax that are practised in Holland, the saving of the price of the seed, and the superior quality of their flax, would greatly enhance their profits; while the vast sums paid every year for foreign flax might be partly employed to pay our own labourers, who work the flax, and the rest realized as profit. Many are averse to that crop, from a notion that it is of a scourging cast. But though some still think so, the general opinion now is that flax is not more severe than oats, or any of the green crops †.

ON AN IMPROVED METHOD OF TRANSPLANTING LARGE TREES.

By Mr JAMES MUNRO, Manager of Messrs Dickson and Turnbull's Nursery, Brechin.

(To the Editor of the Quarterly Journal of Agriculture.)

EVER since the publication of Sir Henry Steuart's work on Arboriculture, a considerable interest has been excited among

* 1 stone Dutch = 17 lb 6 oz. 4½ grains Imperial; and 1 boll of oats = 6 bushels Imperial.—EDITOR.

† We believe no kind of green crop is so severe to the land as a crop of flax, that is allowed to ripen its seed; and if flax were generally cultivated in this country, in order to supersede its importation from abroad, it must take the place of a corn-crop in the rotation.—EDITOR.

land-proprietors in this, as well as every other county in Scotland, in regard to that most important branch of rural economy, and more particularly that delightful, and to a certain extent highly useful, department of forestry,—the transplantation of large trees, whereby, in a comparatively short period, the wilderness can be made to rejoice, and the desert to blossom as the rose. But the great expense and frequent failures attendant on the present somewhat imperfect system, together with the mismanagement of inexperienced operators, have no doubt cooled the ardour of some, and altogether prevented others, from engaging in this species of ornamental planting. The following experiment, performed by me in 1824, as a new method of preparation for large trees, may, I hope, be considered serviceable to the planting community, and by which one-half of the usual labour is dispensed with, and failure rendered next to impossible.

That the nature of my method may be fully comprehended, I shall, in the first place, as briefly as possible, describe the method commonly practised. A tree being selected, suppose an oak twenty-five years old, the labourer commences by marking a circular line in the turf, which for a tree of this age ought to be 4 feet in diameter, the tree standing in its centre. Beyond this a parallel circle is formed, leaving an intermediate space of 2 feet between the circles. This space the workman digs out to the depth of from 3 to 4 feet, cutting every root he finds in his progress downwards. After having attained this depth, he strikes the spade in a slanting direction all round, and under the mass of earth which contains the roots, until he has ascertained that all the bottom roots are completely severed. The loose soil, or a compost in place of it, is then returned into the excavation, and the tree thus remains for one or more years, according to the pleasure of the planter, in what is termed a state of preparation. This method I practised five years on 300 to 500 trees annually, but with so little success, that I became very anxious to adopt a method more certain in its results. An investigation of the system I had hitherto practised, soon made the following defects apparent in it.

On re-opening a trench formed as described above, I found

the young roots formed in clusters around the ends of the old roots which had been amputated; and not unfrequently before the tree could be lifted from its place, the whole of the earth fell away and exhibited five or more bare roots stretching out horizontally, and each furnished with a bunch of tender fibres at the extremity, not unlike the whips of matting used by boys to spin their tops.

Another defect in this mode of preparation is, that, on throwing the compost earth out of the trench, many of the new roots are destroyed by the spade, and all of them are less or more injured by the process of lifting, or subsequent exposure to the atmosphere when removing. A still greater defect in this system, is that of causing to be produced a large extension of fibres at the extremities of the roots, by which a pit of very large dimensions for planting is required. For instance, suppose a ball of earth is cut at preparation to a diameter of 4 feet, beyond which many of the young roots will measure 1 foot in length; to do justice to these by laying them out at full length when planted, 2 feet more are required, and besides, another foot of soft soil is necessary for these tender fibres, that they may the more easily procure nourishment, so that a pit of no less a dimension than 8 feet in diameter is, by this method of preparation, required for a root enclosed in a ball of earth, whose original diameter was only 4 feet. To a tree thus removed, it is almost impossible to afford protection from the effects of the winter storms, and even in summer when the fibres have just begun to fix, they are liable to be snapped asunder by the high winds, which keep the tree rocking about in this large space of loose earth.

I shall now proceed to detail the result of my own experiment. In the winter of 1824, I selected a handsome oak about twenty-five years old, and large for its years. I dug out the earth from between the two circles as already described, and with a saw cut every root and smoothed every wound, where this could be conveniently done with a pruning-knife. The object which I had in view in this operation, was in place of encouraging the growth of fibres at the extremities of the amputated roots, I wished to have them formed within the ball of earth all along the old root, and from root to root. To accom-

plish this desirable end, I threw the loose soil back from the brink of the trench, and roofed in the trench all round with boards, covering up any opening between them with withered grass, and then putting above them about 1 inch of earth. In this situation the tree remained for one year, having no communication with the surrounding earth. At the time I performed this experiment, I doubted whether the tree would be able to undergo this seemingly severe ordeal, but to my joy, when the spring arrived, it was as soon in leaf, made as much wood in the course of the season, and retained the leaves as long as any of its undisturbed neighbours. In the winter of 1825 I took the roofing from the trench, and upon my reducing the ball of earth to a proper dimension for removing the tree, I had the satisfaction to see my anticipations more than realized; for the old roots were not only furnished with fibres, but the fibres were matted sufficiently to retain enough of earth to protect the roots at the time of removal.

This method of preparation speaks so plainly in its own behalf, that I trust nothing more is necessary to recommend it to planters. Those who have any acquaintance with this species of planting, will at once see the advantages it possesses over the old method, and, not to mention the diminution of labour, the obvious certainty of success is enough to recommend it; for there cannot be a doubt, that if a tree were to remain two years under this treatment in preparation, failure would be the exception to the general rule of success *.

* Should any gentleman feel desirous of giving this novel experiment, in the mode of transplanting large trees, a trial, we believe that Mr Munro will have no objection to instruct the workman in it personally, if the above communication is not sufficiently intelligible to any one.—Not having witnessed an experiment of transplanting a large tree on Mr Munro's plan, we can give no stronger testimony as to its efficacy, than its very probably removing two almost insuperable inconveniences in the plan, which that of Mr Munro is meant to supersede, namely, the injury which the new fibres sustain at the removal of the earth or compost from the trench, and the want of earth about the roots of the tree when it is to be placed in its new situation. These were the great difficulties which prevented success in the few attempts which we made in removing grown-up trees.—Editor.

OBSERVATIONS ON THE GENERAL CIRCUMSTANCES AND AGRICULTURE OF THE BARONIES OF FORTH AND BARGY, IN THE COUNTY OF WEXFORD IN IRELAND.

(To the Editor of the Quarterly Journal of Agriculture.)

THESE baronies were colonized from Wales in the time of Henry the Second, and they have still preserved, with surprising distinctness, much of their original manners, habits, and language, which are very different from those of the aborigines of Ireland.

We are desirous of pointing out the peculiarities of this portion of the empire, for the purpose of shewing that Ireland, too often disturbed by local and political circumstances, has within herself a district, occupied by inhabitants capable of affording a valuable example to the peasantry and small farmers of the country at large, with respect to rural management, cleanliness, industry, maintaining their families in comparative affluence, supporting the aged and infirm by voluntary contribution,—having no mendicants within their boundary, and paying their rents and assessments (and tithes until the last year or two) with cheerfulness and punctuality.

This people having for upwards of six centuries preserved their ancient manners, customs, and language, it may not be uninteresting to preface these remarks by an extract from an historical account of these baronies, written by the late General Vallancey, and published in the second volume of the Transactions of the Royal Irish Academy.

"The baronies of Bargy and Forth are situated at the southern extremity of the county of Wexford, and together contain about sixty square Irish miles *.

"They lie due west of Cardiganshire in Wales; the shortness of the passage caused a frequent intercourse between the Irish and Britons from the earliest account of their history.

"In the year 1167, Dermod, King of Leinster, was a powerful prince; the errors of his government, the oppression of his

* Eleven Irish miles make fourteen English.—EDIT.

subjects, and the tyranny he exercised over his nobility, caused a total defection in them, and the people, his kinsmen, friends, servants, and followers, had all been prevailed on to forsake him. In 1168 the distressed king repaired to England, to solicit the assistance of King Henry II., telling him he was become an exile by the treachery of his vassals, and beseeching him to give him aid, whereby he might be restored to his inheritance, which, if it should please him to grant, he would acknowledge him to be his lord, and serve him during his life. King Henry, moved with compassion, promised him aid, and desired him to remain at Bristol until he should hear farther from him. Dermod, after staying there one month, and hearing nothing from the king, weary of delay, applied to Richard Earl of Stregal, commonly called Strongbow, promising that, if he would assist him, he would give him his daughter to wife, and with her the whole kingdom of Leinster; the Earl excused himself, unless King Henry would give his consent.

"In the mean time, Dermod applied to the Prince of Wales, and Richard Fitzgodobert accompanied him, but with so small a body of men, they were of no use, and they soon returned home.

"Dermod finding his subjects still held out against him, caused a proclamation to be made in Wales, offering large recompence in land, money, and cattle, to such as would give him aid. Immediately men of all sorts, and from divers places, prepared themselves to embark for Ireland, under the command of Fitzstephen, who had lately been enlarged from prison by the mediation of Dermod with Rice, a king of Wales. This little army consisted of about 300 horsemen and foot.

"With this small body Dermod did wonders, and being proud with victory gave great discontent to the English, many of whom returned home; but in the year following (1169), Earl Richard sent Raymond Le Grose to Dermod's assistance with a small suite, promising to follow with a considerable army.

"Accordingly, in 1170, the Earl arrived at Waterford with 1600 soldiers. This considerable reinforcement enabled Dermod not only to suppress his rebellious subjects, but also to make war on neighbouring princes.

"Peace being once restored, Dermod made good his pro-

mises, and the part of the country we are now about to describe was parcelled out to the British soldiers, who have remained in quiet possession of their achievements unto this day.

"This colony have preserved their ancient manners, customs, and language, and, fully occupying every inch of ground, the natives could never obtain a re-establishment therein. As population increased, some of the English have been obliged to remove into the neighbouring baronies within these fifty years, and, by an intercourse with the Irish, the language of these emigrants became corrupted; and these, by their connections with their kindred remaining in the baronies of Bargy and Forth, which are called the *English baronies*, have in some measure introduced the corrupted dialect there.

"The town of Wexford is the market to which the colony resorted to dispose of the produce of their farms, and in this market all things are bought and sold in the modern English dialect. This also is another cause of the decline of the language of the colonists, but not one word of Irish is understood or spoken in these two baronies. Still they preserve many words and phrases of their original language, and some original songs, which, having been committed to writing, will exist as long as the people.

"When we were first acquainted with this colony, a few of both sexes wore the ancient dress; that of the man was a short coat, waistcoat, and trunk breeches, with a round hat and narrow brim; that of the woman was a short jacket, a petticoat bordered at bottom with one, two, or three rows of ribband or tape, of a different colour; we have seen one whose jacket was of superfine woollen cloth, of a dark brown colour, edged with a narrow silver lace. The dress of the head was a kercher.

"The names of the old colonists are Hore, Codd, Stafford, Whiteby, Rossiter, Sinnot, Murphy, Stephen, Quincey, &c.

"The gentlemen who now inhabit the country are mostly descended from the officers of Cromwell's and King William's army, viz. Hervey, Nunn, Edwards, Hughes, Palliser, &c."

In the essay from which the foregoing statement has been extracted, are other interesting remarks; and it concludes with a vocabulary of the language of the baronies of Forth and Bargy, and an old song in the dialect of these baronies, which has

been handed down by tradition from the arrival of the colony in Ireland.

Mr Frazer, in his Statistical Survey of the County of Wexford (1807), states, that "to Hervey de Mountmorris, a relation of Earl Strongbow, King Dermod gave the two cantreds, or hundreds, lying between Wexford and Waterford, which are now denominated the baronies of Forth and Bargie; and that a colony of the Anglo-Saxons, who had for some time settled on the sea coasts of South Wales, was planted in those baronies, known in the country, from this circumstance, by the name of the *English Baronies.* That these two baronies were not conquered, or taken by violence, but were granted by Dermod, King of this part of Ireland, to one of the English adventurers who had come over in the reign of Henry, to assist him in the recovery of his kingdoms. That Hervey of Mountmorris, the nephew of Richard, Earl Strongbow, was the person declared Lord of these baronies, and who, it is supposed, brought over the colony from South Wales of the Anglo-Saxons to settle in this part of Ireland."

Without pretending to reconcile the points of difference (which are few) between the foregoing opinions, we shall enter upon the leading circumstances of this very curious district.

First, as to its *Soil and Culture.*

The soil is, for the most part, a retentive clay, except near the sea coast, where it becomes a siliceous loam, to which the long and uninterrupted application of sea-weed and calcareous sand has in a great measure contributed. The farms are, in general, of very small extent,—from 3 acres to 100; very few, indeed, of the latter description, not a great many over 20, and mostly from 7 to 10 acres *. Small farmers may therefore acquire some interesting information from the management of such minute divisions.

These farms are subdivided into very limited enclosures, the fields being nearer to half an acre than to any other quantity; the fences, almost universally, are narrow dikes, with high banks planted upon each side with two or three rows of furze; both

* Five acres Irish make eight English.—EDIT.

circumstances having probably originated in the necessity of drainage, and the want of fuel.

The manures, exclusively of the farm-yard manure, are marl, lime, sea-weed, and sea-sand. In some of the interior parts of the baronies, and in a cold vein running north-west from Greenore Point, termed the Claylands, the deficiency of the soil is marked by inferior crops; but, in general, the produce is very great, and near the sea-coast most abundant.

The usual crops are wheat, barley, oats, beans, potatoes, and clover; hemp and flax are also universally sown in small quantities, to supply the domestic consumption.

Wheat, according to the soil and preparation, yields from 6 to 10 barrels of 20 stone (14 lb. to the stone) per plantation or Irish acre. Barley (the most general crop) yields from 12 to 20 barrels of 16 stone. Beans from 10 to 12 barrels of 20 stone. Potatoes from 80 to 120 barrels of 20 stone.

A chief merit in the agriculture of this district seems to be the systematic relation which is uniformly observed; which, though it may with some individuals occasionally vary, is, nevertheless, in general as follows:—

1st, Wheat upon land (either lea or stubble, as may happen) marled at the rate of 1000 load, of 5 cwt. each per acre.

2d, Barley or oats, but chiefly barley.

3d, Drilled potatoes with dung, or beans sown broadcast, with compost of earth and sea-sand, or earth and dung, or earth and sea-weed; the compost sometimes consisting of all those ingredients in equal proportions.

4th, Barley with red clover, or red clover and rye-grass.

5th, Clover fed off or mowed, the clover seed being frequently saved from the second growth.

6th, Wheat upon clover-lea, upon which they chiefly rely for their surest crop.

In some cases they feed off the clover very early, and marl the lea previously to sowing the wheat, but often sow it without marl, and apply dung to the wheat stubble for drilled potatoes, or manure it with a compost for beans, and so proceed to barley and clover again. Rye-grass is in general sown with the clover, and is usually mown the following season; in very few instances

it is kept for the second year, but is broken up in the foregoing rotation.

When an old lea of good quality occurs, wheat is sown upon it, once ploughed, harrowed in, and shovelled. Barley is also sometimes, but rarely, taken in this way. In general, nothing can be done without manure, and some of the farmers are even profuse in the application of it.

There are some instances of good dairy management, on a scale of from 10 to 24 cows; very few of the latter extent.

The improved barrel-churn is made use of, which saves time and labour. The milk is set for only two days, and none but the cream is churned. The butter produced in this way is highly prized, and the skimmed milk is converted to making a palatable, but not very rich, cheese, which sells at 3½d. per pound.

Having mentioned the usual return per acre of the different kinds of grain produced in these baronies, the quantity sown is yet to be stated, and will appear to the farmer who is accustomed to the drill husbandry, or to a dry soil, extravagantly wasteful. When a good system of draining shall be more generally practised, this profusion of seed perhaps may be reduced, as much of it must now suffer from the wetness of the soil.

The present habit is to sow, per plantation acre, 20 stone (14 lb. to the stone) of wheat, 32 stone of barley, 28 stone of oats, and from 24 to 28 stone of beans.

And though these extra quantities seem to be unnecessary, what is to be said when such an abundant return is the result; for very few indifferent crops of any kind are to be met with? Oats seem to be the worst. They do not rely on this crop to pay the rent, but sow it merely for their horses, and on the worst part of the ground. In certain farms remarkable for producing wheat, *that* is made the staple grain; but, in general, barley is their favourite and money-making crop, reaping, as they do, from 12 to 15 barrels per acre, and on highly cultivated farms, or in districts near the sea, seldom less than 20 barrels per acre, and occasionally 25 barrels.

Their method of putting in the seed is peculiar. They sow one barrel (of 16 stone) under the plough, and a second barrel upon the surface, covering it with the harrow, thereby taking

their chance of the upper or lower stratum of seed, or of both, as the soil and season may happen to turn out.

It would seem that a crop thus sown could not come up evenly or regularly; but this does not appear to be the case. The heavy barley (previously to shooting into ear) exhibits a surface perfectly level, and apparently solid, from the intense thickness of the crop; and yet sowing under the plough is very unusual elsewhere in a strong and retentive clay. Indeed, that barley should have become the chief crop in such a soil, which is in general considered inimical to its culture, is surprising, yet it succeeds admirably, and may furnish an useful hint to countries similarly circumstanced. One advantage in the barley crop is the late season for sowing it, whereby time is gained to get rid of the superabundant moisture of the winter, and to bring the ground into proper tilth, which is here particularly attended to, the roller being in some instances made use of, but in all, the mell or pounder for breaking the balls or clods of hardened clay.

The culture of barley in these baronies owes much of its excellence to the preceding bean crop, which, being sown early and reaped late, interposes its shade to prevent the baking influence of the summer's sun, and to preserve the soil in a certain degree of friability favourable to the production of this grain.

In their management of bean husbandry, there are obvious blemishes; but all remonstrance is silenced by the produce, twenty barrels an acre being not unusual, when the crop hits—seldom less than ten. Casualties will sometimes occur, and an occasional blast will disappoint; therefore the farmer relies not upon this crop, but on the following one of barley, for his rent; but when it succeeds, which it does three times out of four, none can pay better, even at a middle price, and at a middle produce. Suppose 15 barrels an acre, at 30s. a-barrel, L. 22, 10s. per acre. The price varies in the market at Wexford from 17s. to 40s. a-barrel.

They sow their beans universally broadcast. This system is defended on the principle of the soil being retentive, which they conceive would not be in sufficient order to admit the plough as often as might be necessary; whereas by sowing

about Christmas (which is the habit), and trenching up the beds (from 3 to 6 feet wide), no further operation is necessary till they come to pull and harvest the crop.

Notwithstanding the profusion of seed made use of in the former cases, an economy too rigid is observed with respect to clover, 18 lb. being the highest, but, almost universally, 14 lb. allowed to the acre.

That a common farmer, purchasing expensive seed, should limit his quantity as much as possible, would not surprise; but here, for the most part, he saves his own clover-seed, which would entitle him to sow it liberally.

The method by which they save clover-seed is very simple, and has nothing in it of that supposed difficulty which deters the farmer from attempting it, and forces him to relinquish the advantage of this valuable rotation crop, or to procure it by means of foreign seed, at considerable expense.

It is merely this. They let the first growth of the clover be fed off, at an early season, in general by the middle of May. The second growth is suffered to run to seed. When fully ripe, particular attention is paid to the careful saving of the hay, which, when perfectly dry, is immediately well thrashed, whereby the ripest of the seed is shaken from the hulls; and the hulls or heads being thus separated from the stalks, and put through the stones of a common oat-mill, all the remaining seed is thereby extracted. Some farmers merely thrash for the prime grain, and sow the hulls under the harrow; nor are they even thus disappointed in the crop.

This is a feature in the rural economy of these baronies well worthy of imitation. It is the basis of a rotation system, which would be generally adopted but for the cost of clover-seed.

The common farmer does not want intelligence to perceive the value of a clover crop, but he too generally wants the means to procure it.

If a certain rotation of sowing be allowed to be beneficial, the farmer should have the respective seeds within himself. He takes care to be provided with his potatoes, wheat, barley, or oats, from the year before; and, by taking the hint from the English baronies, he may also have this connecting crop of a

profitable succession, without being obliged to send to a
and expensive market for the seed.

It is to be hoped, that, from its being ascertained in t
trict that clover-seed saved at home produces an abund
healthful crop, the practice may spread through other
nor should the farmer be alarmed by want of perfect suc
consequence of a bad season, or other disappointing
stances; unless he intend it for sale, the brightness of the
and plumpness of the seed, are not of very great imp
In case of a strong proportion of decayed and unpr
grains in the parcel which he has saved, he has only to i
his quantum of seed per acre in a similar proportion,
object will be still attained.

Habitations and Management.—The inhabitants o
baronies are enabled, by the industrious and skilful mana
of their farms, to avail themselves of the comforts and d
of life, in a degree seldom to be remarked amongst th
orders of Irish. Their habitations, though built wit
are neat, cleanly, and commodious. Stone is not to be ha
out great expense; but the surprising expertness with
this substitute is handled and moulded into habitabl
makes a quarry altogether unnecessary. With a com
moistened clay and straw, without plumb, square, or le
merely with an instrument they call a sprong (which is
with four long prongs, and a long handle), every man
ble of erecting a house for himself, compact and perpen
executed with such accuracy that the exterior walls are
to eighteen, and its partitions to twelve or fourteen in
thickness. These are sometimes made of raw bricks, c
moulded, which, for inside work of this description, ans
markably well.

The house, when plastered with a finer preparation
and whitened with lime, looks quite as well as if con
stone; excludes the air better than ill-executed walls
material, possessing the advantage of being cool in sum
warm in winter.

The form of the houses in these baronies is perfectly
teristic, never departed from by the affluent farmer or t

est labourer. The scale varies with the circumstances of the proprietor, the elevation never. It in general consists of two stories, the upper story lighted by a well-sized casement in the end. Every house has a central porch, one or two good windows at each side of it, and in the centre of the house invariably rises a chimney of brick, well built, and finished rather ornamentally on the outside. The gables are uniformly hipped, a little higher than is usual, to admit a sufficient window in the second floor, and to gain the proper head-room. The roof is of a steep pitch, thatched, in general, with wheaten straw, and with as much attention to neat appearance as to the durable execution of the work. The eves are made to project considerably, and are secured from the ruffling of the wind (as the ridge and hips are also) by scollops, forming a fancy border, which gives to the whole a character of skilful workmanship. At the extremities of the ridge are placed pinnacles, compactly formed of straw, securely roped, of eighteen inches high, and twelve inches at the base, which, never being in any instance omitted, either upon house or offices, constitute much of the characteristic peculiarity of those buildings. They are, besides, always unconnected, the offices standing at rectangles with the front of the house; and when it comes to be considered (which is well worthy of note) that no farmer in these baronies, even upon five acres of land, is without his stable and his barn, and that those are executed in the same form as the dwelling-house, but separated from it, and thatched and pinnacled in the same manner, it will not be difficult to conceive the striking appearance which those multiplied and uniform buildings must afford in a very populous district.

A person who rides through these baronies is seldom without ten or twelve of those groups immediately under his eye. In some places they neglect to whiten their houses, which, from the material of which they are composed, present but a dingy aspect; but in others, they not only whiten the walls, but the ridge and pinnacles; and if a group of this description happen to have the embellishment of a few trees, which is sometimes the case, the effect is picturesque. But it is not the *exterior* which is most deserving of notice or of praise. A regular system of *interior* cleanliness and comfort is observed; one striking

instance of which may almost suffice to obtain credit for all the rest.

It is thus, that, throughout these baronies, the houses are well lighted, (a circumstance in itself friendly to cleanliness); the windows are of good glass, varying in size, in proportion to that of the habitation; but, from the best to the meanest, are kept in a state of brightness. A sullied pane would be considered a disgrace to the house in which it was remarked, and the careful cleaning of the single window in the cottage of the poorest labourer, is considered a daily duty, and is fulfilled with a perseverance which might be adopted with much advantage in greater houses.

There can be no doubt that cleanliness is a test of the moral *influence*, without which there can be no real amelioration of the condition of the lower classes.

In each house is a manufactory of almost every article necessary for home-consumption, even to the making of their own sacks and ropes; for which purpose the farm is supplied with a proportionate sowing of hemp. Flax is also cultivated by all, and manufactured for domestic use. Those who have not sheep, of which there are very few in this district, purchase the wool, and have it spun at a factory established for the purpose, and make it into stockings, blankets, and a species of clothing called linsey-woolsey.

This extreme degree of industry accounts for the corresponding comfort of these people.

In every house indiscriminately are also manufactured, for the use of each individual of the family, hats of straw, of a close texture, and remarkably well made. This is a source of occupation to the younger branches, and a most desirable application of their industry, furnishing a striking feature of civilization in the general appearance of the inhabitants, as neither male nor female is to be seen out of doors without a straw hat or bonnet, except on Sunday, when the men, as a point of dress, wear purchased hats of wool or beaver.

The women work in the fields, and at reaping receive the same wages as the men. They are all neatly dressed, wear gloves, and shade their faces from the sun by a kerchief worn under their bonnet. They are in general very well looking, of

a fair skin, and good complexion. This is in a great measure to be attributed to the absence of smoke, as there is no instance to be met of a house without a regular chimney. On Sunday they are dressed particularly well, and this comfortable and affluent appearance of large congregations returning from their places of worship in an orderly and decent manner, is truly respectable.

From the total absence of peat as fuel, and from the hardy habits of the people, they hold themselves independent of fuel, except for cooking purposes, and have even brought themselves to talk of it, as an uncleanly and unnecessary superfluity. Some of the upper class of farmers make use of coals from Wexford at a high rate, including carriage. Not very many, however, indulge in this luxury. The general fuel is furze, with which the fences for the most part abound, and, where this is not the case, the haulm of the bean crop is wholly dedicated to this purpose. Nor is even this resorted to, except at the time of preparing for meals. Whether this self-denial with regard to what is usually looked upon as a chief comfort and necessary of life, can be considered a prudent species of economy, admits of a doubt.

Their climate is certainly mild, and the inclemencies of frost and snow are but seldom, and for a short duration, experienced. Add to this, that their houses are impervious to wind, and secure from the admission of rain, being furnished with well-fitted doors, and perfect windows. Yet is the ague prevalent amongst them, not so much, perhaps, from the evaporation from a retentive soil, as from the branch of economy in question, which induces them to wear their clothes insufficiently aired; for if either man or woman return from fair or market in wet weather, the coat or cloak, which has been drenched with rain, is merely thrown upon the hedge; and to avoid the cost and trouble of a good fire, is put on again in a state of dampness that must be obviously unwholesome.

In a country where so much good management is practised, one would think a more liberal use of fuel would be an improvement. Except in the scarcity of fuel, however, as has been before observed, the appearance of substantial comfort which pervades these baronies is generally remarkable, and in some instances

particularly striking. In one part of the district are eight tenants, on farms of fifteen acres each, who are supposed to be worth some thousand pounds. Their houses are most comfortable, and to each is added a small lodge of lime and stone, two stories high, and slated, which they let for the season to sea-bathers.

Their stack-yards are well supplied with wheat, barley, beans, and hay, which they are never obliged to dispose of till the market is at the highest.

Some of the wealthiest of them have lately ventured upon Government debentures, and one of the party is sent up half yearly in the mail-coach to the Treasury, to receive the interest, and to make further purchases. The same families have occupied these farms at a low rent for a series of years, and even at the last renewal, their philanthropic landlord, pleased at their prosperity, to encourage and reward their industry, relet the farms to them at a rent not much exceeding one half the usual rate of the country.

Another farmer upon thirty acres merely, had purchased the fee of seventy acres. And a very small farmer in the same neighbourhood, supposed to be worth L. 300, had acquired it by his industry and economy, upon a farm of seven acres, which limit he has never exceeded. This man has been known to hold over his wheat (newly thatching it every season) for years. After a year of fair and remunerating prices, this cannot be defended on the score of good management, but is a decided proof of affluence. All the farmers of these baronies, great and small, have corn-stands of stone, with sufficient caps, to resist vermin, and their stacks are uniformly as carefully thatched as their houses.

The foregoing instances, it must be admitted, are prominent features of that prosperity which results from an uninterrupted course of industry. In many cases there must be a greater struggle, but indefatigable attention will always prevail. This is evinced in a particular manner in the barony of Bargy, where, under circumstances the most unfavourable, that anxious industry which characterises this district is exerted, and succeeds. A bleak and barren moor is here to be seen, being in respect of soil a stiff white clay, from which any surface of ve-

getation that may happen to gather upon it is pared off for firing. Part of this moor having been protected as a hurling-green, exhibits a proof-piece of the original quality, which is a moory sod, of about eight inches in depth, inclining to loam, and well suited to cultivation.

The whole of this common, had it not been a *common*, might have been as productive as the adjoining farms, but it has been cut away for fuel, and even the hurling-green is now, by joint consent, converted to the same purpose,—the surface-sod having been sold to aid in the erecting of a new chapel.

This last spoliation left the moor in a state of total barrenness, yet (paradoxical as it may seem) will eventually have been the means of its improvement.

The native industry of this district excited by the overflowing increase of a particular people, unwilling to migrate or to separate, is applied to exertions unheard of in other circumstances.

The most denuded parts of this miserable moor, no longer attractive as a common, either for pasturage or fuel, are now taken possession of by industrious occupants, who have built, and are building, on their several inclosures, neat and comfortable houses, and are forming their respective estates into small square fields, by well made ditches, enclosing an area of white and barren clay, without a symptom of vegetation. If ground of this description is worthy of being taken in, and capable of being reclaimed, the mode of its improvement deserves notice. It is effected thus:—After the divisions have been formed, the occupiers make use of every exertion to scrape together any vegetable mould which they can discover. The low and hollow parts of the moor (where, from the lodgment of water, the surface is unadapted to fuel) give some assistance in this way, which, having been gathered for some time into heaps, they draw to their barren field, and spread on in the form of ridges, digging the intervals or furrows, which, by the following year, are so far ameliorated, as to mix to some advantage with the artificial ridge. To this they add whatever manure or compost they may have collected, and take with it a crop of potatoes. This point once attained, they go forward systematically, till a surface-sod is produced, by laying down with clover and rye-

grass, and having afterwards drawn a sufficient coat of marl upon this, they reckon themselves secure as to all future produce, cultivating the usual routine of crops with the regular application of manure or compost, in which lime is sometimes a chief ingredient.

In this case they have an additional stimulus to their industry, as improving their own property. This circumstance occurs also on the mountain of Forth, where land taken in in the same manner, cleared of rock, and carefully improved, has become the uncontested possession of the descendants of the first occupiers, out of which they vote as freeholders hitherto exempt from rent, tithe, or tax.

This species of improvement on the moor is not prohibited by the proprietor of the surrounding soil. It is either undertaken by the rich farmer who has money to spare, or by the poor cottager who is in want of a settlement. The habitations of both present themselves, the former on a good scale, well built and comfortable; the latter, though of the smallest description of house, yet, in point of neatness and cleanliness, so striking and picturesque, as to arrest attention, and make it impossible to pass without desiring to have a view of the interior.

In one of these (18 feet by 12 in the clear, and six feet high in the side wall, divided into bedchamber and kitchen), without any previous notice of a visitor, appeared as much cleanliness and comfort as could be found. The house white as snow inside and out; the thatch in perfect order, and ornamentally executed; the clay floor dry, smooth, and swept; the door sound, fitted to its door-case, and impervious to wind; the fire-place and chimney of brick, with an ingenious contrivance for a warm press in the flue-wall; the dresser clean, and displaying three tiers of dishes equally so; the pewter-spoons as bright as silver, arranged in a little frame in three retiring rows; the whole protected from the dust of the roof by a matting composed of junks of wheaten straw, stitched together with cord; and both rooms brightened by a sufficient light from well formed cottage windows, which are never suffered to remain a second day without being cleaned.

The old woman who presided, in answer to a compliment paid to her extreme neatness, replied, "that it deserved none,

that her mother taught her to be cleanly, that it was a nasty thing to be dirty, and she could not bear it; that there was no trouble in being clean; that it was only to go about the business regularly, and there would not be ten minutes more lost by it in the day; but she hoped the gentleman would take a look at the garden, for it was far cleaner than the house."

The approach to the garden was by a narrow gravelled path, neatly edged, through a stripe of mown grass, ornamented by a few healthy shrubs. The garden itself, not a quarter of a rood, but planted round upon the back of the fence with trees, and having in it a proportionate garden-house and pigeon-house, only six feet square, a gravel walk, a plot of cabbage, a crop of peas, with a number of lilies, roses, and various other flowers.

The farm (not exceeding two acres in the whole, divided into five fields by parallel fences), was entered through a double gate of cheap materials and workmanship, fixed upon the head ridge of the first field, which head ridge was continued open through all the divisions, giving the opportunity of drawing the manure to each of them, and of separating any of them from the rest by an occasional gate.

The crops were barley, oats, beans, and potatoes, surprizingly good for such a soil, the entire improvement having commenced within five years.

The family, an old man and his wife, with two grown up sons, one of them a tailor, the other a labourer.

This minute detail is intended to show that, even amongst the least affluent in these baronies, cleanliness and comfort are become systematic from habit, and that, therefore, the introduction of such habits amongst the lower classes, however arduous and disappointing at first, will tend to establish them eventually. At present, however, the inhabitants of this district are more regular of their own accord, than are the peasantry elsewhere in ornamented cottages, subject to the frequent inspection of the most anxious proprietors.

But to return to the great source of the prosperity of this district—its thriving agriculture. In viewing the luxuriant crops in other parts of these baronies, one would suppose them scarcely to be rivalled, yet, in one favoured parish, they seem to be exceeded. The soil is a rich, dark, sandy loam, with a sub-

stratum of yellow clay, of course retentive of water, and requiring surface-drainage, which is here beneficially practised.

The ease with which sea-manure is procured adds annually to its fertility. This parish forms one of the eastern points of Ireland, called Carnesore Point; and being peninsular, bounded on the south and east by St George's Channel, and on the west by the Lady's Island Lake (which communicates with the sea), all parts of it are within the reach of sea-sand and sea-weed, the latter being washed in by the surf, and deposited in large heaps, which ferment and putrefy, and are drawn up in that prepared state (as also in a *fresh* state occasionally) for the use of the respective farms.

The general method is to make a compost heap, consisting of equal proportions of sea-weed, sea-sand, earth and dung, which is applied to the bean and potato crops, after either of which they take a crop of barley, sowing with it red-clover and rye-grass, which they mow but once, (unless when clover seed is to be saved); and mending, as they term it, the clover lea with a little of the compost, they sow barley again, and after that, in some cases, oats, previous to a new dressing of manure for potatoes or beans, thus keeping up an enriched and unvarying rotation.

Parts of this peninsula are scattered over with rocks or boulders of granite, of various sizes, some of which they undermine and bury, and are not deterred from the use of the plough, even where numbers of these rocks appear upon the surface, being repaid by abundant crops. What obstacles in farming will not industry and manure overcome!

This parish consists of 1000 acres, a fifth part of which is under sand-banks and waste, and at least a tenth of it of that rocky description which has been mentioned. 100 acres are supposed to be annually under the plough, upon which the crops are, drilled potatoes, beans, barley, oats, (wheat rarely), hemp, flax, clover, and rye-grass, all of the best description, and of the most productive return.

The number of families are ninety-six, notwithstanding which there is every appearance of comfort and abundance, but three persons of the entire number requiring charitable support, and these three aged women.

There is scarcely a stackyard to be seen without a supply of corn (at least one-fourth of the annual produce) remaining in the middle of July, and yet the rents of any land let within seven years are from 35s. to L.5 an acre *.

During the years of high prices for agricultural produce, rent seemed to be a secondary consideration; what change may now be expected is matter of anxious speculation, even the farmers of the barony of Forth are under considerable alarm; and if they shall find themselves unequal to the late rents, it is to be feared that few other parts of Ireland will be able to bear up against them, for the farmer in these baronies can do more on seven acres, which is the usual extent, than in other places is effected upon twenty.

The circumstances and produce of a farm of seven acres were noted with great accuracy, and the following is the result:—

A Farm of Seven Acres.

Crops.	Acres. A.	R.	P.	Barrels per Acre.	Total Barrels.
Barley	3	0	0	20 of 16 stones.	60
Beans	1	2	0	16 of ditto.	24
Wheat	0	0	20	8 of 20 stones.	1
Oats	0	1	0	20 of 16 ditto.	5
Potatoes	0	2	0	120 of 20 ditto.	60
Meadow	0	3	0	2¼ tons hay.	
Pasture	0	1	0		
Hemp, Flax, Garden, House, Offices	0	2	20		
Total acres	7	0	0		

Stock—Horses, 2; Cow, 1; Sow, 1; Pigs, &c.

At the high prices for corn, those seven acres would yield a handsome profit, even at a high rent; but it must be considered that, exclusive of the rent and taxes, a number of persons are to be supported, and in a degree of comfort, too, peculiar to these baronies, and especially in this particular parish.

In so very populous a country, an equal prosperity cannot be supposed to pervade every house, and some, either from disposition or from necessity, may not live as liberally as their neighbours; but the general habit is said to correspond with what

* These observations were made in the year 1824.

was observed in the house of a farmer upon ten acres,—a family of seven people dining comfortably upon meat and potatoes.

The regular routine is this. On Sunday, a large piece of pork or bacon is boiled, in some cases accompanied by a joint of half-fed veal; on Monday and Tuesday what remains of that is served up cold; on Wednesday, herrings; on Thursday, pork or bacon boiled; Friday and Saturday, herrings. The staple vegetable the potato forms a material dish at every dinner. For breakfast, they have uniformly barley bread and milk; for supper, potatoes and milk. This is universal in the parish of Carne, and pretty general through other parts of these baronies.

With scarcely any pasture ground, the horses are kept in good condition, by having the grass which grows upon the banks cut and carried to them. In every respect an extraordinary industry prevails. Rents are paid with the utmost punctuality, and the farmers are enabled to live comfortably and respectably, a credit to the property on which they reside.

A tenant upon 20 acres executed a farm-house of 47 feet by 18 in front, and 14 feet high in the side-wall, with a brick porch. In the upper story, three rooms; on the ground floor a kitchen 18 feet by 14; parlour 15 by 14; bed-room 10 by 7; a small store-room and two unexpensive staircases; which latter and very unusual circumstance was sensibly accounted for, by the farmer's correctness and propriety, in wishing to have the apartments of the males and females of his family (consisting of eleven persons) kept perfectly distinct. So much attention was paid by this industrious man, not only to the decencies, but to the comforts of his house, that his windows, $4\frac{1}{2}$ feet by 3, with double sashes, were so contrived, by means of side-springs, made by the village smith in place of pullies, as to remain open when acquired for the purpose of ventilation.

Good farm-houses are general throughout this parish, and indeed throughout these baronies.

If any neglect, dilapidation, mismanaged culture, or deficient crops, meet the eye of the inquiring traveller, he will learn that it occurs on the estate of an *absentee* proprietor.

In the foregoing portraiture of the rural manners and habits

of this ancient colony, there exist many features in its agricultur and domestic management, neither to be imitated nor approved Compared with the order, exquisite domestic neatness, anc improved husbandry of *England*, it is highly defective; yet i furnishes, *in general*, to the *Irish* cottager and small farmer ir almost every other portion of Ireland (favoured spots in *Ulste* excepted), a striking example of industry and cleanliness, o comfort and independence, which we trust to see imitated befor many more years shall have passed, in despite of the politica agitations with which this unfortunate country is too often tor mented. D.

ON THE CULTURE OF THE CHICCORY *(Cichorium Intybus.)* By *Mr* GORRIE, *Annat Garden.*

(To the Editor of the Quarterly Journal of Agriculture.)

IT is now nearly half a century since the culture of chiccory *(Cichorium Intybus)* was recommended in agriculture by the celebrated Arthur Young, who writes of it in the highest terms of commendation. "On various sorts of soil," he says, "the farmer cannot without its use make the greatest possible profit," and adds, "there is no plant to rival it." This assertion, indeed, was made at least twenty years before the far-famed *Symphytum asperrimum* had been introduced to this country, when, after its arrival, nearly thirty years passed away before its services were transferred from the gay parterre and bouquet, to the byre and pig-stye, in company with the yellow day-lily, lately pressed into the service of the dairy.

The *Symphytum* and *Hemerocalis* are propagated by slips, and such plants, consequently, bring a high price, a guinea per hundred having been paid for plants of the former, while as many plants of chiccory may be raised from seed at the expense of a single penny. The original outlay, however, might only form a point of minor consideration, where the balance was in favour of subsequent advantage; but although I have paid some attention to the culture and comparative merits of various agricultural plants, and those above mentioned amongst the rest,

yet I have found the culture of the chiccory easiest and cheapest in the outset, and also very decidedly most profitable as a perennial crop,—it yielding nearly double of nutritive matter as green food in summer, from the same breadth of ground, to any other plant with which I am acquainted.

It is well known that this plant is extensively cultivated in many parts of Russia, in Germany, Flanders, and other parts of the European continent, for its roots, which are used as a substitute for coffee; and it may not be very easy to account for the inattention to the culture of so useful a plant by the British farmer, it being only known in this country, though it is a native, as an antiquated kind of salad.

By Young it is said to form a substitute for clover; by others that the plant rises from one to three feet high, and if raised by being mixed with other seeds in the same manner as clover, intended for hay as pasturage, it may not exceed that height, nor is it often found in its natural state above two or three feet in height. It should be remarked here, that *Cichorium Intybus* has a fusiform sort of root; and it is a well known fact, that the luxuriance of stem and foliage of such plants is in proportion to the thickness and strength of the root. Judicious culture, therefore, *in the early stages* of its growth, is necessary to secure future luxuriance. Let the seeds be sown in a bed early in March, and when the leaves are about three inches in length, which they will be by the beginning of May, let them be planted out in well pulverized ground, in rows 9 inches apart, and 6 inches from plant to plant in the rows. The weeds must be kept down by hoeing the first season, but no farther trouble is necessary for seven or eight years, till the plants begin to show symptoms of decay, when they may be thrown out, the ground cleared of the roots, and laid under a fresh plantation.

When this plant is allowed to stand too close, as in mixture with grasses or clover, the root is small and the stem small, short, and wiry. Under the above mode of treatment, even in ordinary soils and *with little manure*, the stems will rise to 6 or 7 feet in height, and they will be as close as to admit of being covered with foliage, the stem varying from three-eighths to five-eighths of an inch in diameter near the ground, and replete with a rich nutritive milky juice. This succulence is retained

in full vigour till the flower-buds begin to appear, when the stems should be cut out near the ground, and carried to the byre or pig-stye, where even at the *first trial* they are devoured with avidity.

It will be readily observed, that as the chiccory is in some sort perennial, its culture cannot be attempted in a rotation of cropping, and it must therefore be confined to some steep declivity or corner of a field inaccessible to the plough. On waste corners, near large towns, no plant cultivated in this climate will bring the cowfeeder nearly an equal return with the chiccory; it should also hold a prominent place in the garden of every cottager in the kingdom, whether to be used as coffee by the family, or as green food by the cow or pig. Were its culture general in Ireland, it would soon prove of more substantial advantage to the labouring classes in the Emerald Isle, than many of the political panaceas of the day.

REMARKS ON UPPER CANADA, AS A COUNTRY FOR EMIGRANTS.

By Mr James T. Sommerville, Mayfield, Township of Whitby, Upper Canada. Communicated by the Gentleman in Edinburgh, to whom the Remarks were addressed.

I CONFIDENTLY expect, that long before you receive this letter, you will have heard of our safe arrival in Canada, in good health and comfortable circumstances. We stopped at Quebec for eight or ten days, during which time I never allowed my family to quit the ship, in dread of the cholera, which raged in that town at the time with very great virulence. We then proceeded to Montreal, but the cholera raging there with still greater virulence, we immediately proceeded on our journey to York with all due speed. This is performed partly by land and partly by water, the accommodation in both cases is, perhaps, as good as the country can afford. The charges, however, are very high, having paid for my luggage alone, from Montreal to York, nearly L. 12, and for my family a great deal more. From Quebec to Montreal my luggage cost nothing, this difference in the circumstances arising entirely from the great opposition on

the latter road, and none in the former. Our journey, however, upon the whole, was comparatively agreeable, and, under a superintending Providence, we arrived at York in safety and good health.

I had expected, upon arriving at York, to have stopped there for a month at least, and left my family, while I myself surveyed the country, for the purpose of obtaining information and procuring a permanent place of residence; but I found this plan to be quite impracticable, owing to the state of the town as regarded the cholera, and especially in regard to the enormous rents of houses. I therefore determined to quit York next day, and proceed to Whitby, and, accordingly, I procured a coach for that purpose, and came to John W——'s. We stopped there for eight or ten days, till our luggage arrived. I then procured a small house: we lived in it for four or five weeks, when a farm of 100 acres of land coming into the market, which I considered well worth the money asked for it, I purchased it, and am now lodged in my own house, and at my own fireside, with my family around me, all in excellent health and spirits. I have thus shortly conducted you from Quebec to York, and from York to my *lairdship* in Whitby, where I shall leave you for a while, and proceed to matters of perhaps greater interest.

The scenery upon the banks of the river and lake between Quebec and York is very dull, and altogether uninteresting; at least it appeared to be so in my eyes, and I believe in the eyes of Scotsmen in general, who are so much accustomed to hill and dale. Excepting towns, such as Montreal, Kingston, a few villages and farm-houses, nothing is to be seen but an interminable forest of wood, stumps of trees, and wooden fences, which are at first sight calculated to damp the spirits of the emigrant, and to make him wish he had never left his native land; I can assure you I then felt that Canada as it is, was not the *Canada* I had formed an idea of in my own mind. I was severely disappointed in this respect, and I believe thousands have experienced the same kind of disappointment, and have returned home with an evil report of the country, without giving it any thing like a fair trial. I mention this circumstance, in order to warn any person who may be similarly affected not to despair,

but only to allow reason to resume its legitimate sway, and those airy castles which had been formed in the imagination will be demolished in a moment. Canada will then be seen as it really is; and what is Canada? you ask. I shall try to answer the question. Well, then, Canada is a country where persevering labour and industrious habits will accomplish what similar persevering labour and industrious habits will not accomplish at home. I frankly confess, however, that the change of life, coupled with the entirely different manners and customs of the people, so wrought upon me as to damp my spirits very much; so much so indeed, that I deeply regretted I had ever left Scotland. I then found it no easy matter to bid adieu to my native land,—the land where repose the ashes of my father, my mother, and sister, the wife of my youth, and some of my dear children; it was then that the early scenes and associations of my boyhood and youthful years rushed into my mind in all their native force and impetuosity, and in language of silent eloquence, unuttered and unutterable, the places where they occurred were consecrated in my mind as "holy ground."

Whitby is universally allowed to be one of the finest townships in the whole of the Upper Province. Its local situation, as regards markets and other conveniences, is very good, and there is always a ready market here for every kind of farm produce. The soil is excellent, and taking all things to account, generally well cultivated; the price of land here is rising very fast; that which was selling last season, at from fifteen to twenty shillings per acre, has advanced to 25s. and 30s.; and cleared land which was selling at L. 4, 10s. per acre has advanced this season to L. 5 or L. 6, and in all probability will advance still higher; so that it appears to me quite plain, that those who intend to emigrate, especially those who intend to purchase land, should do so as soon as possible. Whitby, in my opinion, seems a very eligible situation for emigrants of almost every description. There is not a baker in the whole township, nor a flesher; a wright and cabinet-maker would succeed well, provided he kept close to his business; and a tavern-keeper, to let lodgings to travellers, and be discreet, would also succeed. Store-keepers have all made fortunes, and more fortunes may still be made, by emigrants judiciously following out the same line of business. But why do I enumerate?

suffice it to say, that Canada is a rising country, and every class of emigrants must succeed, provided they act with prudence and caution.

There are a good many Scotsmen settled in this township. Upon the one hand, and within ten minutes' walk of my house, is a Mr A——, a justice of the peace for the district. I had the honour and pleasure to dine with him the other day, when I found him to be a very agreeable and intelligent gentleman. His case is a singular one, inasmuch as it clearly shows in a strong point of view, what perseverance and industry will accomplish under trials and difficulties seemingly unsurmountable. This gentleman came to the township of Whitby, about twelve years ago, without any original capital. He bought 200 acres of land, and began clearing it with great spirit. He built himself a log-house, and all things seemed to go on and prosper with him; but in an evil hour his fair prospects were completely blasted, and his fondest hopes dashed from his lips. His log-house was reduced to a heap of ashes by fire, and his little all perished along with it: he, however, by extraordinary perseverance and industry, soon overcame the whole disaster, and he is now proprietor of 300 acres of as fine land as Canada can boast of. His whole property cannot be valued at less than between L.2000 and L.3000. The next instance I shall mention is that of Mr T—— from Symington, in the Upper Ward of Lanarkshire. This gentleman came to this country about three years ago, and brought L.500 with him; he has now property worth L.1200. Much about the same distance from me as the two former gentlemen, is a Mr B—— from Roxburghshire; he is cousin to the Rev. Mr B——, the Secession minister in B——. He came to this township about two years ago, and without any original capital, has succeeded in getting his farm mostly cleared of wood and mostly cleared of debt. This gentleman is certainly a very remarkable instance of what perseverance and industry will accomplish. Nearer me still are the Messrs W—— from Stockbridge: these gentlemen have bought 100 acres of good land at a remarkably low price, which promise to do well. The next is Mr John H——: he has bought 100 acres of very fine land, and has begun the clearing of it with great spirit. Adjoining to him is a Mr John B——, from

the neighbourhood of Carnwath, who came out this season: he has bought 300 acres of excellent land, and has also begun to improve it with great spirit. Removed at a still farther distance from me is Mr John W—— from Canonmills, Edinburgh, and others with whom I have no particular acquaintance. I am sorry to say that Mr W——'s prospects are none of the best, and will be so for some time to come, owing to circumstances over which he had no control; and the losses he had sustained at sea has rendered his situation, for the present, very distressing. He has set his face, however, with great spirit and determination against his difficulties, and I have no doubt he will soon overcome them. You will thus see, from what I have here enumerated, that I am in no want of Scotch society, and it only requires a few more to enable us to go on in public matters with great spirit and complete success.

In regard to the state of religion in this township, the majority of the inhabitants are composed of methodists and baptists, and the remaining part of presbyterians and quakers. These different classes have all of them places of worship, except the presbyterians. A petition, however, was drawn up lately, which obtained a very considerable number of signatures, requesting a supply of sermon; and it is now in contemplation to build a place of worship, which I hope will not be lost sight of. Schools for the education of youth are very numerous in this township, but much requires to be done to obtain better teachers. As society advances, however, this inconvenience will be rectified.

This season here has been rather backward, in consequence of which a considerable failure in certain kinds of crop has taken place. Wheat, upon the whole, may be considered an average crop, and so may oats; but hay, Indian corn, buckwheat, and potatoes have failed to a considerable extent. On this account, markets are expected to be very high, and holders of grain are beginning to speculate upon the subject. Wheat has been selling, during the summer, as high as 6s. and 7s. per bushel, and other kinds of grain in proportion. Potatoes are at this time selling at 10s. per two imperial bolls, and are expected soon to be much higher. Butter brings 10d. per lb. and at times 1s. Cheese from 10d. to 15d. per lb.; eggs 7d. and 7½d. per dozen; mut-

ton and beef 3d. or 4d. per lb.; veal the same; and pork sells at from L. 3 to L. 3, 5s. per barrel of 200 lb. Cows from L. 4 to L. 6; a good pair of oxen, from L. 17, 10s. to L. 20; and horses from L. 20 to L. 25 each. Farm-servants get from L. 25 to L. 30 per annum, with victuals. It is impossible for me to say what are the wages of mechanics, as I have not been able to obtain correct information upon the subject. Harvest wages are a dollar per day, but you can cut your crops much cheaper here than in Scotland, by what is termed *cradling*. Wheat and oats are very commonly cut in this way by the scythe; and I can assure you a very excellent way it is. A Canadian can easily cut two acres of wheat per day, and there are plenty of labourers who will take it to cut at 5s. per acre and upwards, according to the heaviness of the crop. The farming-utensils seem well adapted to the present uncultivated state of the country, and work well where Scotch carts, ploughs, and harrows would be of no use; and the same observation applies to carriages upon the road. Upon land free of stumps, however, the case is different. Upon such, Scottish implements of husbandry are decidedly preferable. Oxen are much used in husbandry; and, in so far as my opinion and observations extend, they are used wisely. It is truly astonishing to see these cattle drawing the logs of wood together in heaps to burn, and to see them ploughing and harrowing among the stumps. I have often stood upon the road in passing, and admired the docility and power of these animals; and, while viewing such scenes, have thought that Canada could not have been cultivated without them. The quick speed and impatient dispositions of horses, utterly unfit them for performing such work. The same observation applies to work on roads in wet weather, as oxen will go through with the same load where horses would turn restive, and refuse to work; both are best, however, and Canada is richly stored with both.

In regard to my own situation and prospects, I am truly happy to say they are cheering; and it is allowed on all hands, that the purchase I have made is a good one. It is of 100 acres of good land, 50 cleared, with an excellent new barn upon it, built this season, which cost L. 70, with a frame-house, and other offices. The soil is a deep rich loam, and adapted to every

kind of crop. Its local situation is also excellent, being within one mile of the main road between York and Kingston, where coaches pass daily, and about three miles from Windsor Bay, where there is plenty of shipping to all parts. A fine stream of water runs through a part of it, on which is erected a saw-mill, and presents one of the finest situations for a grist-mill, which is much wanted in this part of the country. The price I paid for my land was L.256; but, after deducting the improvements upon it, the land itself cost only 22s. 6d. per acre,—a small price, when it is considered that uncleared land in its neighbourhood is selling at from L. 2 to L. 2, 10s. per acre. My prospects of a crop next season are not of the most flattering description, owing entirely to the extreme indolence of the person from whom I purchased it. I shall have five acres of wheat in good condition, and other crops in proportion. I intend to keep ten milch cows next summer, which will pay me well, as dairy produce sells very high. By next fall of the year, if I live so long, I shall have fifty acres ready for wheat, which, calculating the produce per acre so low as from 25 to 30 bushels per acre, will bring me from 350 to 400 bolls of wheat, of four bushels each, which, at 5s. per bushel, will be L. 400. This, along with the produce of the cows, and other crops, will bring me a sum nearly equal to pay all expenses, and the whole of the money I paid for the land. I do not mean to say that I shall have fifty acres of wheat annually, but I do mean to say that, by prudent management, and persevering industry, I shall be fully enabled to realize between L.300 and L.400 a-year, for the payment of expenses, and the maintenance of myself and family. This circumstance, coupled with the fact that I have no rent to pay, and almost no taxes, certainly presents, in a worldly point of view, a cheering and animated prospect. This I believe is no exaggerated statement; but, as I have had no opportunity of realizing it in my own experience, I only offer it as my own opinion. Being on the spot, however, and judging from the state of the markets, and other circumstances, I not only offer it simply as my own opinion, but as my decided conviction. If the above statement be at all correct, and I believe I am rather below the mark than above it, then it must appear perfectly plain to every unprejudiced mind, that, in so far at least as

worldly circumstances are concerned, the ends of emigration are completely fulfilled.

It is undeniably true, that, if a person is judicious in laying out his money upon land, and industrious, he must here be independent; and, let it be understood, that the same remark applies to every other branch of trade. It is no uncommon occurrence, however, to find persons possessing from 100 to 300 acres of land, of the first quality, not at all able to support their own families,—this proceeding entirely from their indolence; but this circumstance, melancholy as it is, constitutes one of the reasons, among many others, why an industrious man makes himself the sooner independent, inasmuch as the indolent individuals alluded to are concerned, the markets for grain, and other farm-produce, remain almost entirely unoccupied by them, and their indolence, too, throws them as local purchasers instead of sellers, into the market. The prospects of the farming interest in this young country, are certainly of a very pleasing description, and they are calculated to rouse and animate the mind to redoubled activity and vigilance to better, by honest industry, the circumstances of yourself and family.

All kinds of farm-produce have been on the increase for these two or three years past, and still continue so. I believe I am correct when I say, speaking generally, that both cattle and grain have risen one-third, and in some cases more than one-half, within the time alluded to. A farmer here is at little or no expense with his young cattle. After they are one-year old, they are turned into the woods, where they thrive remarkably well; they will regularly return to the farm once or twice in the fortnight, for the purpose of getting a little salt, a thing that all cattle must have in this fresh-water country; they then go back to the woods again, and I have not heard of one of them being lost. As to swine, the case is somewhat similar. Many a farmer keeps 50 or 60 of these animals, which do not cost him one sixpence for keep, excepting when they are put up to feed off; they then get a little Indian corn, pease, &c., and, as I am informed, they pay well. Under these circumstances, it must appear evident that the land which would thus be required for the maintenance of the above species of stock, the farmer has it in his power either to put a crop upon, or milch cows; and this

management presents another source by which he may calculate with safety the sooner to raise himself to independence.

Such being the facts of the case, and when they are fully considered, I have not the slightest hesitation in declaring, that it appears to me as plain as the sun at noonday, that a farmer in Scotland, occupying a farm that does not pay him, distressed as he must be, perplexed and degraded, toiling from morning to night, with a degree of mental anxiety and anguish pressing upon his mind, calculated at once to unnerve all the energies of his mind, and to bring him to a premature grave, and yet, after all, quite unable to support his family or better their circumstances in any degree; I say, that a farmer in such circumstances, and continuing so, while so much land lies in Canada to occupy, acts the part of an insane person, and brings down upon himself the charge of "providing not for his own, and especially those of his own house." The laws of both God and man call loudly upon such a person to rouse himself from the lethargic, and seemingly fatal, slumber into which he is fallen; and, by one grand and mighty effort, shake himself free of the difficulties by which he is encompassed, and, along with his family, cross the mighty Atlantic, and set himself down in *Canada*, where his talents and industry as a farmer will be far better paid, and his character in society, both in a moral and political point of view, more duly appreciated; and where he is entirely free from being frowned upon by the great, or vexed by persons whose conduct indicate that they consider him as the very off-scouring of society. These observations apply with equal force to every other class of persons placed in similar circumstances, and to all such the call to bestir themselves is equally loud. If I were asked the question, whether (taking all things into consideration) I would purchase land or betake myself to some other calling? I would instantly answer, I would buy land. I do not mean to say, however, that purchasing land is the quickest way of making a fortune here; I believe the reverse to be the fact. I am persuaded, however, it is the safest plan in the long run. In regard to people in the mercantile way, I am credibly informed that there are several in this line, and even in this township, who have realized fortunes, within these ten or twelve years, of upwards of L. 15,000. This fact speaks volumes to persons in

that line, and requires no comment from me. I would say, then, to the unfortunate but industrious people of my native land, Come to Canada; fear not the raging of the sea, or the dangers of the land, even for months; for that God, who has so mercifully preserved and protected my family and myself, and thousands besides, will preserve and protect you also; and although, upon your arrival on a foreign shore, disappointment, and trials, and difficulties will encompass you in many and varied forms, take courage, and be not disheartened, for by patience and perseverance you will soon surmount them all; and I can assure you, from my own experience, that when placed in your own house, and by your own fireside, surrounded by your family, and recounting to each other the trials and difficulties you have encountered, and the dangers you have escaped, you will then look back upon such scenes with mingled emotions of wonder, gratitude, and delight.

I shall now state a few things which may be of use to such of my readers, for whom these remarks are intended, as may have emigration in view. I here wish it distinctly to be understood, that I mean to offer no advice, but simply to state my own opinion, leaving those who read to judge and determine for themselves.

The price of land varies, in the townships, according to the circumstances in which it is placed; for instance, land upon the front of the township, cleared and free of stumps, sells from L. 5 to L. 6 per acre, upon a farm of 100 acres in extent, and 75 acres cleared. Again, a farm of the same extent of land and clearance, but the stumps upon it, and similarly situated, sells at from L. 4 to L. 4, 10s. In proportion, however, as you go back into the township, the prices fall. A farm of 200 acres, 7 or 8 miles back, with 70 acres cleared, but the stumps upon it, sells at from L. 2 to L. 2, 10s. per acre, there being houses upon the farms in both cases to less or more extent. Uncleared land, in the former situation, at L. 2 to L. 2, 10; and, in the latter case, at L. 1, 5s. to L. 1, 10s. per acre. Lodgings are scarce here, which presents very serious difficulties to emigrants with large families. I was exceedingly put about in this respect, but they were soon overcome; a room, with fire-wood included, cost 5s. per month. Persons with small capital, as from L. 50 to

L. 100, must lay their account with hard work. In my opinion, all such persons ought to buy land, if they intend to do so at all, whenever they arrive, and pay the first instalment; then they should work at some trade or other for a year or two, and, in the interim, pay the instalments as they fall due; and they may depend upon it, they will find this plan very much to their advantage, as it will assuredly better their circumstances considerably, and enable them to go on to their land with every prospect of success, for, without such a precaution, I am credibly informed, that many small capitalists, in the course of a year or two, got so embarrassed as to be obliged to quit their farms, and their situation became incomparably worse than at the first. Upon the whole, from what I know personally, and from the experience of others, I am decidedly of opinion that, in all cases of the above description, the plan I have just now recommended ought invariably to be adopted.

There are very few lots of land to sell in this township, but there are plenty of farms to purchase from private individuals. Of the few lots for sale, I shall give you a description of one of them. This lot is situated upon the front of the third concession, about one mile distant from the main road from York to Kingston, and about three miles from the Lake. It consists of 600 acres of excellent land, with a large stream of water running through it; and it includes by far the best waterfall, and situation for a grist mill, that is to be found in the whole township. The price put upon this lot is L.1, 10s. per acre, and it is certainly well worth the attention of capital and enterprise.

In my opinion, all articles of household furniture, husbandry, utensils, &c., ought to be brought out, at least in so far as the circumstances of the individual will permit. I hazard this opinion from my own experience; because, had I known what I know now, I certainly would have brought out more than I did. The price of conveyance from Quebec to York is 4s. 7d. per cwt. All articles ought to be put up in as small packages as possible; and china, crystal, and earthenware, ought to be carefully packed. I unfortunately had the most part of my furniture of this sort broken to atoms. With regard to how emigrants ought to bring out any capital they may have, I dare scarcely venture an opinion upon it. I brought mine in gold,

and got 24s. for each sovereign, which certainly paid well. Upon the voyage out the provision store should consist mostly of oat-meal, plenty of potatoes, eggs, hams, plenty of porter and ale, which will be found useful; tea will not be much used, but coffee will; likewise rice, and other articles, to make puddings; also, plenty of red herrings, which you will find very useful indeed, dried fruit, &c. Be sure to lay in provisions for three months at least; and if you do not use them all on the voyage, you will find use for them afterwards. I would strongly recommend all emigrants to come out by New York. The expences are much the same in both cases, and the passage shorter, and by far the safest. You will get intelligence there which way to proceed to go to York, or any other place in Upper Canada.

I had written thus far when I have to state, that I have purchased 50 acres of more land, adjoining the 100 acres I purchased formerly. I paid a rather high price for it, L.3, 10s. per acre. It, however, makes my farm a complete one; and which is not surpassed for quality of soil, and local situation, by any farm in the township of Whitby. There are about 30 acres of cleared land upon the 50; so that upon the whole farm there are 70 acres cleared, 50 acres of them with stumps, and 20 acres free of stumps. I have let about 30 acres of wood land to be chopped, logged, burnt, and fenced, and ready for receiving the seed by the 1st of September next, at L.3 per acre. If the land is sown down with grass seed, immediately after the first crop of wheat, and remains so, it will require ten or twelve years to rot out the stumps; but if it is continued under the operation of the plough, the stumps will come out in six or eight years, and in some situations a good deal sooner. This purchase will materially increase my yearly income, without adding much to the expense. In the mean time, however, my expenses are high; but not near so high as the same extent of land would require in Scotland for stocking it only, *and a heavy rent to boot*, and the returns are not much less.

The weather here at this time, 14th November, is uncommonly fine, with a slight frost in the mornings, and clear sunshine through the day. I will have the most part of my land ploughed before the winter sets in, which is calculated to take place about six weeks hence. I have hired a man of the name

of John C——, a Scotsman, from Symington, in the upper ward of Lanarkshire, who came out this season. He seems a very quiet and steady lad, and ploughs uncommonly well; and, with his help, I intend to chop 10 acres of wood during winter. The wood upon the land here is not very heavy in general, the trees are very tall, but not of great girth; and, of course, they are more easily managed to cut into proper lengths for drawing into heaps to burn.

I have thus endeavoured to give all the information at present in my power. The facts stated may be depended upon; and as regards my *own opinions*, you can in this matter adopt or reject them as you choose. I must say, however, that I have given them candidly and honestly; so that whatever difference of opinion may exist upon this subject, I can say from the bottom of my heart my opinions are conscientious and sincere. Emigration, however, is a serious matter; and I would advise every person to be fully persuaded in his own mind before he resolves upon taking the step. You can easily perceive, by the tenor of this letter, what my mind is upon the subject. But as I said before so I now say again,—let every one who reads these words judge and determine for himself.

I shall now conclude, by observing that Canada may, with propriety, be emphatically styled the *poor man's country*; to such persons the prospects in this country are certainly cheering; language cannot describe the thrill of pleasing and delightful sensations which must take possession of the breast of every one, who, from a state bordering on absolute destitution, is suddenly raised to a state of comparative plenty and independence. He only can fully appreciate them, who in distressing circumstances must often have looked with trembling emotion upon the wife of his bosom, and the dear innocent and prattling pledges of their mutual affection, and also, with tears in his eyes, have viewed his approaching misery with horror and dismay. The contemplation of such misery is calculated at once to palsy every nerve within him, and freeze the blood within his veins. If there is any so lamentably situated, let him be assured they will here experience a change for the better. The minds that were once the constant prey of fearful forebodings of approaching wretchedness, are here peaceful and serene; the

clouds that were dark and lowering, and threatened an overwhelming storm, will here pass away; and the sun, which for a time was obscured, here suddenly breaks forth in all his noonday brightness. Here may such persons (as far as worldly circumstances are concerned) calmly lay down their heads upon the dying pillow; and though their weeping family surround their bed, deprecating their departure from them, yet they may commit their souls to God, and close their eyes in death, without a corroding thought of what is to become of their surviving relatives, after they have gone to "that bourne from whence no traveller returns."

14th November 1832.

ON A CASE OF FISTULA IN THE WITHERS OF THE HORSE; AND ON CASES OF DISEASE IN THE HEART OF CATTLE ARISING FROM THEIR SWALLOWING NEEDLES AND PINS. *By Mr William Dick, Veterinary Surgeon, Edinburgh.*

In a letter lately received from Mr John Steel, veterinary surgeon, Biggar, my *quondam* pupil, is an account of some cases, which I am inclined to think may interest your readers. The one case shews how much may be effected by perseverance and attention, while the others as clearly illustrate, that "to prevent is better than to cure."

The first is a case of fistula of the withers which had occurred about the 1st of May, in a four-year old mare, the property of Mr Charles Johnston, farmer, Candeyburn, Skirling, county of Peebles. The disease had originated from a simple bruise with a riding-saddle, and had been treated as such by the owner, until it appeared well, when the mare was turned out to grass. No attention had been paid to her until the end of July, when it was observed by the owner that the withers had become very much diseased. The mare was thus shewn to three of the neighbouring farriers, who would have nothing to do with her. Mr Steel was then called, and he states that he found it one of the worst cases imaginable, the parts being enormously enlarged, and sinuses running downwards in various directions, between the scapula (shoulder-blade) and the spinous processes of the dorsal vertebræ (the withers). As matter was confined in the

sinuses by their position, and as the interior of them had, by the long continuance of the disease, become indolent and callous, "I introduced," he says, "setons, so as to make dependent orifices, and continued these until the beginning of September, injecting, during that time, a variety of stimulants, to promote a healthy action, but without effecting any improvement. I therefore determined upon laying open the part freely, and in course of the operation dissected out the diseased portions, which were pretty extensive. From this time the wound assumed a healthy appearance, and continued to improve until about the middle of October, when, for some cause which was not very apparent, an immense abscess formed between the scapula (shoulder-blade) and the chest, and burst out at the anterior part of the shoulder, pouring forth a large quantity of acrimonious matter, resembling in appearance moss-water. On enlarging the opening, so as to allow the introduction of my hand, a great quantity of detached portions of the muscles, tendons, &c. was found in the cavity, which, when removed, resembled rotten flax. The cavity extended from the top of the withers downwards fifteen inches, separating at the upper part of the shoulder from the trunk, exposing on the one side the cartilage and bone at the superior part of the shoulder-blade in an extensively diseased state; and on the other side of the wound the spinous processes of the vertebra in a similar condition. From the time of laying the part open until the beginning of December, the progress was slow, but at the latter period it began to improve rapidly; but about the middle of January the mare was attacked with catarrhal fever, during the continuance of which the wound made very little progress in healing. After her recovery, however, the wound again began to improve, and with the exception of two or three backward turns, went on well until the end of July, when it had completely healed. Since that time she has been kept at constant work, and the parts have continued quite well." The treatment consisted chiefly in making dependent orifices, cleaning the wound, and dressing with stimulating washes and digestive ointment; and although some surprise may be excited at the length of time required for the cure, still, when the extent of the wound, the complicated nature of the parts involved in the disease, and consequently the obstinate nature of

the disease itself are considered, I am sure it will at once be allowed that Mr Steel has much merit in the skill and perseverance he has shown in the cure.

In the second part of his communication to me, he has detailed an account of some cases of disease in cows, arising in the heart from wounds by needles and pins.

The first he mentions is the case of a cow belonging to Thomas Fairley, weaver, Biggar, "to which," he says, "I was called on 11th June last, and found her labouring apparently under inflammation of the lungs, and treated her accordingly, but, as will be seen in the sequel, with little success. On first seeing her I found her pulse 80, the breathing rather laborious: she had been observed a little unwell for some days prior to my being called, but was not thought very ill. On the 12th, symptoms rather increased, pulse 85, breathing rather quicker. 13th, toward evening getting still worse; was seized with a shivering fit, which lasted half an hour, after which she seemed somewhat easier, and ate a little food. On the 14th the pulse had risen to 95, her breathing still quicker; she was again seized with a shivering fit, which lasted somewhat longer than on the preceding day; there was a strongly marked expression of anxiety and alarm in her countenance; she generally stood with her fore extremities wide apart, and she inclined to lean forward on the stake with her shoulder, lying down and rising frequently up, shewing considerable uneasiness. On the 15th the pulse was 100, the other symptoms much the same as on the preceding day; had another shivering fit about the same time, and of similar duration. On the 16th, the symptoms somewhat easier, the pulse 96; she took a little food, and was not observed to have any shivering fit that day. On the 17th the disease had considerably increased, the pulse 110, small and wiry, and she had another shivering fit. 18th, a great deal worse, pulse 122, with a strange fluttering feel; she became paralysed in the extremities, and died on the 19th.

"On examining the chest I found a wire-needle, about six inches in length, which had penetrated into the left lung, and it at the same time wounded and penetrated the substance of the heart; and from the appearance of the parts, seemed to have been in that situation for a considerable time; but although this had

been the case, there was nothing more than a little discoloration and puncturation for half an inch around the wound which had been made in the heart by the play of the needle: the wound which had been made was about half an inch long by one-eighth of an inch wide; the left lung, into which the wire-needle had penetrated to the extent of five or nearly six inches, was in a state of gangrene, while the right lobe of the lungs remained quite healthy.

"On the 29th of June I was called to a cow belonging to Mr Cooper, Welston, in which I found symptoms precisely similar to those I have already detailed in the last case. She died on the 4th July, and was examined by the owner according to my directions, and it was found that the heart was in a dreadful state, with a needle, about two inches long, stuck into it, in a nearly perpendicular direction. On seeing the needle, a woman recognised it as one she had used to pin up some part of her dress when she milked or tended the cows, and which she had lost some considerable time before. She knew it, because it wanted the eye, and was otherwise remarkable.

"On the 6th of July I was next called in great haste to a bull belonging to Mr Gray of Cairnsod, but ere I reached the place the bull was dead. On dissection I found the heart very much diseased, and a needle sticking in it; but the only description I could get of the previous state of the animal was, that he was observed to be unwell for several days before his death.

"Soon after these, another case occurred in a cow belonging to Mr Maclean of Greenshiels, and in her the symptoms were similar to the first mentioned case. She lingered for several days, and died with two large pins (called here *Willie Cossar Pins*) sticking in her heart.

"The next case I met with, and in a short time after the last, was in a cow belonging to Mr Russell of Greenshiels, next house to Mr Maclean's, where the last mentioned case occurred. [illegible] symptoms the cow died after a few days' illness; and on dissection, I found a needle in the heart.

"Again, a cow belonging to Mr Blacklain, Skirving, died after several days' illness; and, on dissection, I found a needle in her heart.

"In other cases which I have been attending, I have had

strong reason to suppose that a similar cause of the diseases exists; but not having been able to examine them myself, or to obtain correct information about them, I am unable to speak decidedly in regard to them. It is, however, a well known fact, and which has been observed by many farmers and graziers, that numbers of such stock die from a similar cause."

It is therefore a matter of some importance to avoid the cause which thus so surely destroys the lives of such valuable animals, and this, as Mr Steel observes, might be easily accomplished, if the owners of cattle, and more especially of cows kept in a dairy, would recommend that their milk-maids should use hooks and eyes, buttons or strings, to fasten their clothes with, rather than needles and pins. These latter must always be liable to burst from their hold, and fall out whenever any exertion is made by the person using them. Trifling as this remark may appear, it is a serious matter when the use of what is considered a necessary accompaniment of the female toilet affects the lives of valuable animals.

Mr Steel had not finished his letter to me, when he was called to another case, in a cow belonging to Mr Robert Black, Biggar, which, from the statement of the owner, had been in a backward state all summer; and that a few days prior to his visit an enlargement had appeared on the abdomen, which was found, by the person who was examining the nature of the enlargement getting his finger pricked, to arise from a long needle, generally used for mending worsted stockings, and the point of which was protruding through the skin. It was of course drawn out, and the cow has since been doing well.

These are unfortunately not solitary cases; for similar ones are to be met with in every part of the country, and they well deserve attention. I have taken a score of pins from the paunch of a cow, and have met with many more cases, both in my own practice and that of my friends in the country. On one occasion my father extracted a large needle from the tongue of a horse, which was brought to the forge here, because it was said to have given up feeding. On introducing his hand to examine that nothing was wrong with the teeth, the needle was found almost entirely imbedded in the tongue. When it was taken out, the horse was at once relieved.

These cases are useful in a twofold point of view, first, in pointing out the source from which this evil springs, so that the prevention of the evil is in the power of every one. We cannot suppose cows to swallow needles or pins but by accident; but if they were not carelessly placed within their reach, the cows could not obtain them to swallow. We need not wonder at these accidents to animals, when we find that sometimes even human beings will so far forget themselves as to allow such bodies to pass into their stomachs. There is a case of this kind mentioned in the 8th volume of the Lancet, p. 240, in which it is mentioned that "395 needles were taken from different parts of the body of a woman." These must all have been swallowed, for upon no other supposition can we account for their being in the living body.

In the second place, they will serve to explain to the veterinary surgeon the nature of such cases when they occur, for Mr Steel observes that he found in all those mentioned, that the nature of the disease was well marked by the daily attacks of shivering, and the occurrence of paralysis a short time prior to death; the other symptoms also indicating more febrile action than acute pain.

It has been suggested to me that pieces of wire falling away from the riddles made of wire, which are very commonly used in some parts of the country for the cleaning of grain, may be inadvertently thrown upon the dunghil with the refuse from the barn, and there picked up by the cattle in the court.

ON THE EFFECTS OF THE LOW PRICE OF CORN BY FOREIGN IMPORTATION ON AGRICULTURE AND MANUFACTURES.

(*To the Editor of the Quarterly Journal of Agriculture*).

ALTHOUGH the subject of the Corn Laws be trite as a thrice-told tale, yet is it of such moment to the public at large, and of such peculiarly absorbing interest to your readers, that I deem it unnecessary to offer any apology for pressing on their attention, some considerations regarding the effects of the low price of corn on the agriculture and manufactures of this kingdom.

An address has been, not long ago, presented to the landowners of England by Viscount Milton, and such is the favour with which it has been received, that no less than five editions have already gone through the press. I pass over other similar publications without heed, in the confidence that the calm judgment of my countrymen will deal with them as they deserve; but the nobleman who now puts forward his claims to notice, is a person of too much weight and character not to merit a reply. He addresses himself to agriculturists, "because it is through and by you that an alteration, which appears to him to be essential to the welfare of the country, must be effected;" and that object is stated by his Lordship to consist in what he calls "*the reduction of the price of corn to its natural level.*"

On this statement I take leave to say, that there is no such thing in existence as a natural level for the price of grain: its only natural value is estimated by the amount of manual labour which is required to produce it, and which admits of but one relative standard in all parts of the world; yet it varies in every country according to the condition of each. It is to the price of corn in this country that his Lordship's remarks are directed; and his complaints of its high price are founded upon the ground, "that the largest portion of the labour of husbandry is expended on the purchase of bread, and that no class of labourers is more interested in having corn cheap, than those who are engaged in husbandry; because there is none that spends so much comparatively upon the necessaries, and so little upon the comforts or the luxuries, of life."

His Lordship is too deeply concerned in husbandry to be duped by fallacies which he really deems to be inconsistent with the interest of landlords. In addressing himself, therefore, to the labourers of the United Kingdom, it is to be presumed that he founds his arguments on the broad basis of national welfare; that he neither means to captivate the cupidity of individuals at the expense of the entire body, nor to separate the interest of the labourer from that of his employer; that while he holds out the prospect of gain to the one, he does not mean to tempt him with the spoil of the other; and that his only view is to produce abundance to the working population. But however benevolent the intention of his Lordship may be, I will boldly ven-

ture to affirm, that no political writer who looks upon the real situation of the mere English peasant, can ever consider him as permanently interested in the question of prices. He may, indeed, be either momentarily benefited, or the contrary, by a temporary change in the state of the market; but it will speedily find its level through the medium of the value of labour, which no other than an artificial state of the community can ever raise beyond the amount of common subsistence. His Lordship has, however, embodied the arguments adduced at various public meetings, held for the purpose of taking into consideration the distressed state of the country, which have been passed in the form of resolutions to the following effect: "That a great portion of the suffering which the people of England are enduring is occasioned by laws, which, by the imposition of heavy duties upon imported corn, enhance prodigiously the prices of the prime necessaries of life, curtail the sale of our manufactures in foreign countries, and compel those nations who would have been our customers to become our rivals."

Now, nothing can be more easy than for men who are allowed to assume their own data, and thence to draw their own inferences, to satisfy themselves by most plausible arguments of their accuracy; but they who are sufficiently sceptical to doubt this mode of reasoning, will require them to establish the premises before they agree to the conclusion. As one of these, I now beg to offer a few observations.

By the petitions on this subject which have been presented to Parliament, we learn, from the highest authority, that the exportation of British produce and manufactures *has lately exceeded that* of former years; the suffering thus complained of cannot, therefore, have arisen from the decrease of sale to which it is ascribed by the petitioners. The opposite fact shows, that it lies deeper than a temporary stagnation of commerce, and proves that its removal is not to be effected by foreign trade; its origin and remedy must consequently be sought for in other sources.

Upon this various opinions are entertained; some attributing it to the removal of restrictions on our import trade; to the chan in the currency; or to over-production: others to the of our corn laws. The remedies proposed are as different

as the interests espoused by the opposing parties; the one contending for the exclusion of all foreign produce similar to our own, the other insisting on the advantage of entire freedom in the corn trade, and consequently of low prices. The principles upon which the latter opinion, which is that of the petitioners, is founded, are,—

That, by permitting the free importation of grain, we should certainly create a demand for our manufactures *to that extent;* as the foreign grower must necessarily take them in return.

That, while the unrestricted importation of grain would lower its price here, it would at the same time so raise it abroad as to bring the value nearly to a level in both countries; and that, while we should thus be upon equal terms with the foreigner as to the wages of labour, which is regulated by the price of corn, the superiority of our manufactures would induce him to give us the entire supply of his market.

That through this additional demand from abroad, we should also gain the advantage of additional consumption at home, by the increased means of purchase that would be thus afforded to our manufacturing population. And these unanswerable arguments, as they are termed, are usually summed up by an appeal to our feelings, upon the inhumanity of taxing the subsistence of the poor, through a duty upon corn, and thus forcing our artificers to want bread, while our neighbours are ready to fill our granaries with wheat, and to accept of our manufactures in exchange.

To all this it has been replied,—That it is not food that is scarce in this country, but the means to purchase it; and that those means can only be found in the employment of our entire population:

That every bushel of corn imported while our growth is equal to our consumption, must displace so much of our own, and consequently throw the land producing it out of cultivation, and the labourers out of work; for, although it may be true that we should pay for it in manufactures, yet so should we, were it the growth of our own soil; and therefore, "to that extent," the only difference between the two cases would be, in the one we should have the foreigner for a customer, and in the other our own countrymen; and we should thereby encourage

the agriculture of other countries at the expense of our own, and clothe the foreign instead of the British peasant:

That the principle which supposes prices to be brought nearly upon a level in the respective countries, is founded upon a false doctrine, inasmuch as corn can always be afforded for the cost of its production, and the greater charges of taxation, and the more luxurious style of living in this country, will never allow the British to compete with the foreign grower. But, suppose that level to be gained by an import-tax upon corn, and that it should consequently become as dear to import it from the Continent as it costs to grow it here, we must then raise our wages, to meet the rise of price, and that would bring us back to the point from whence we set out, for we should lose "the advantage of additional consumption of our home manufactures:"

That if, therefore, through the importation of foreign corn, we lower the rate of wages, in order, by manufacturing cheaply, to induce the foreigner to become our customer, we shall at the same time deprive the workman of the supposed advantage of cheap bread (for it must be immaterial to him that the price of bread be low, if his wages be reduced in the same proportion); and if his wages are not reduced, the presumed increase of home manufactures will no longer exist. In the one case, therefore, the workman could be no gainer, nor the manufacturer in the other; and thus the scheme would demolish itself.

If these premises be correct, the propositions in favour of low prices, through the free importation of foreign grain, will resolve themselves thus:—

That except in case of dearth, the importation of foreign grain, and the prosperity of our agriculture, are incongruous:

That the presumed advantages of importation, by raising the price of corn abroad, while it would be diminished at home, until the wages of labour in this and foreign countries should be brought upon the same level, are, by any fair means, unattainable:

And, that an increase of our foreign trade, through the effect of low wages, and the increase of home consumption of corn,—both arising from the same cause,—are incompatible.

But, in order to develope these several propositions, we must investigate the arguments on which they are founded.

It is an axiom of political economy, "that legislators should make it their study that every useful commodity be sold as cheap as possible, in order that every individual may obtain for his labour the greatest possible quantity of objects of enjoyment*." This is the basis of the arguments in favour of the free importation of corn; but it obviously rests on the assumed foundation, that the remuneration of labour shall be equal to the purchase of those objects of enjoyment which it contemplates. Cheapness is only a relative term for the power to supply our wants: thus, at first sight, a loaf will be considered dear at a shilling, and cheap at sixpence; but if the labourer earns 2s. a-day at the higher price, and only 1s. at the lower, it is to him equally cheap at either. "That a duty upon corn operates as a tax upon the subsistence of the poor," is mere declamation. Labour is like any saleable article in a public market. Its value depends on the demand for it. Should that afford occupation for all, the cost of the common necessaries is unimportant to the labourer; for, in order to work, he must be maintained, and if the price of those necessaries should rise, so must his wages. But if there be not occupation for all, then advantage is taken of the competition for employment; wages are reduced to the lowest standard of support, whatever may be the price of bread, and those who cannot obtain work must be provided for at the public expense. Poland has long been considered the granary of Europe, yet while her warehouses are encumbered with wheat, her squalid peasantry subsist on the coarsest rye-bread, not because they have no relish for better, but because they have no employment whereby to earn the means of buying it. Still nearer home, with a climate and soil perhaps the most favoured for the common productions of the earth of any country in the world, and with an immense annual export of grain and cattle, the Irish cottar is, from the same cause, forced to live upon potatoes. Bread was at an extravagant price in this country from 1809 to 1814, yet the labourer did not complain, for there was ample demand for his work, and wages were in proportion. In 1822 the price of all agricultural produce fell to one-third of its value, and the consequence was universal distress. At this mo-

* Boileau, Introduction to the Study of Political Economy, b. ii. ch. 1.

ment England abounds in all the common necessaries, and a large portion of her population is starving*.

The present distress of the labouring classes arises neither from any dearth of food, nor from its cost; for it is both abundant and cheap. We actually enjoy the advantages on which the economists have speculated,—low prices, and an increase of foreign trade; but not the prosperity that was predicted as their certain consequence. Its cause can, therefore, only be found in their want of occupation; and yet in the face of that fact, recorded as it is in the books of every parish in the kingdom, we are called upon to make a further sacrifice of the national industry.

Were this country incapable of growing corn sufficient for its own consumption, there would be manifest injustice in keeping up the price by duties on importation. But unless when Providence visits us with an unkindly season, the produce of the land is equal to the demand; the duties—whether judiciously calculated or not—are only intended to protect the grower from unequal competition; and it cannot be denied that, in common years, the dearness of grain is solely occasioned by the expenses of cultivation. The real cost of its production—nationally considered—is the amount of labour employed in its growth; and it is certain that, in consequence of our superior skill, more corn is grown upon one acre of land in England, than upon an acre of equal quality in any other part of Europe. But the cost price to the grower—independently of rent—is made up of taxes, wages, and the use of capital; and it is obvious that, in a country abounding in wealth, and containing a dense and intelligent population, the united competition of capital and in-

* The fallacy of the money-prices governing the measure of subsistence to the poor, when there is a sufficiency of employment, is no where more apparent than in the table furnished by Lord Milton, at the end of his pamphlet (Table A), for he there makes the excess of the difference between wages and the cost of two-thirds of a bushel of wheat only to amount to 1s. 2d., while in 1822 it was 6s. 4d.; yet so far is this from the real fact, that the peasantry enjoyed abundance in the former year, while in the latter they were perishing by thousands, from the want of employment. The truth appears to be, that whatever may be calculated as the apparent prices of corn and labour, they really act upon each other to procure a sufficiency of food whenever there is a sufficiency of labour.

dustry must reduce the profit on the production of any staple article of consumption to the lowest scale. It is not, therefore, in consequence of any natural disadvantage, or of any inordinate profit to the cultivator, that corn is dearer in England than elsewhere; it arises from artificial burdens on the soil, which are higher here than in other countries.

As the first and most tangible burden upon the land is rent, the advocates of low prices have not failed to insist on its reduction; not alone as the inevitable consequence of the free importation of corn, but as an immediate sacrifice due to the public weal. Upon the justice of which it may be observed, "that, were the farmer to hold his land rent free, he would not sell his produce one shilling below the market price; and whatever may be the terms on which he holds it, he cannot obtain one shilling more, for the price is always governed by the proportion of the supply to the demand. High rents are, in fact, only the consequence, not the cause, of high prices; rent of land, therefore, solely concerns the two contracting parties—landlord and tenant; and whether the proprietor chooses to farm it himself, or to let it upon lease, is of no kind of importance to the consumer. The only way in which he could be affected, would be by the existence of such a monopoly as might enable the landowner and the farmer, jointly, to raise their profits beyond the rate commonly obtained by other capitalists and traders." *

That is, in fact, the question in point; and here let it be remarked, that the funded debt of this country representing a large proportion of its capital, and being more easily convertible into cash than any other species of property, regulates in a great degree the real interest of money. Accordingly, the value of land—regarded merely as it is affected by rent, without reference to extraneous considerations of preference—is governed by the price of stocks: it rises and falls as they do; but from some supposed advantages attending it as an investment, it seldom affords an equal return of interest. The security for the possession of either is the same—the public faith, pledged to the fundholder

* Library of Useful Knowledge: Farmer's Series, British Husbandry, No. II. p. 59.

rous articles imported for immediate use, can be no otherwise affected than perhaps by a small saving on freight; unless, indeed, the reduced means of the consumers should lower the price by lessening the consumption.

The farmers, too, have been sneered at, as being ignorant of their own interest, in making common cause with their landlords; upon the presumption that they would actually profit by a reduction of prices, in consequence of its releasing a portion of their capital, and enabling them to employ it upon a superior culture of land *. But neither is the country cramped for agricultural capital, nor is our cultivation defective; or if defective, it can only be gradually improved by the joint application of additional science, as well as money. This presumed release of capital, would, however, be immediate, if it were employed, while its future application could only be progressive; but its employment is in fact wholly illusory, for the farmer's capital is either invested in improvements upon the land, or upon his stock, and as their value would necessarily be diminished by any reduction in the price of corn, he would not have any surplus capital to spare. The stock would, indeed, still remain the same in substance, but not in convertible value; consequently it could not add to his means; and inevitable ruin would be entailed on any farmer who holds his land upon lease at a money rent. It is no answer to this to say, "The landlords must reduce their rents;" they have the power to enforce them; if they exercise that right, they ruin the tenant, and if they forego it, they lay him under obligation; he would therefore be compelled to sacrifice either his property or his independence. In time the evil would no doubt create its own remedy, for no business can be long continued at a loss; but in the interim, what would be the amount of calamity which would ensue?

The advocates of importation, indeed, tell us, "that by lowering the price of bread, the price of labour will be so much reduced, that the British farmer will be enabled to cultivate his land at as little expense as the foreigner, and to sell his corn as cheap; and that this cheapness will increase the consumption in an equal ratio to the importation; so that, rents can still be paid,

* See the Edinburgh Review, No. 88, Art. on Mr Jacob's Report on the Trade in Corn; and No. 100, Art. on Political Economy, p. 349.

and no land need be thrown out of cultivation *." But if this be indeed true; if consumption should really increase in an equal ratio to the imported supply, the original prices would then be maintained; wages would again rise in the same proportion; and the whole fabric of the argument in favour of low wages, founded upon a low price of corn, would fall to the ground.

It can be hardly necessary to prove the self-evident proposition, "that every bushel of corn imported, while our growth is sufficient for our consumption, must displace so much of our own." Indeed these gentlemen admit, that a great part of the poor soils of this country would be thereby thrown out of cultivation; but they urge, that what we should lose in corn by their re-conversion to pasture, we should gain in meat; and that, as the loss of the corn would be supplied by importation, the encrease of our live-stock would be so much real addition to our actual means of subsistence. But without adverting to the injustice of thus despoiling those who have invested large sums in the enclosure of waste land, practical agriculturists would tell such reasoners, that an acre of poor soil can be made to support more live-stock under tillage, *besides the product of the grain*, than an equal quantity in pasture. So far, therefore, they argue upon false premises; they forget, too, "that it is labour which puts the greater part of the value upon land †;" and they are not perhaps aware, that, since the adoption of the alternate system of husbandry, some of our light soils have been made to produce crops of corn, equal in value to the fee-simple of the land while it was in pasture. Whatever may have been the pecuniary result to individuals, still it must be admitted, that the produce is so much national gain; and that the labour employed in the cultivation affords subsistence to a large portion of our industrious population, who would otherwise be destitute of support.

The reasoning of the economists, however, goes farther; for they argue, "that the tillage of poor, being more expensive than that of rich soils, the price of grain is enhanced by the cultivation of bad land." It is indeed true, that, independently of

* Edinburgh Review, No. 88. † Locke on Civil Government.

the consideration of rent, rich land is the most profitable, and, had we enough of that quality, there can be no doubt that it alone would be devoted to the plough; but the proportion which such land bears to the lighter soils of the kingdom is so small, that were the latter thrown out of cultivation, the remainder would probably not amount to one-third of our demand. The richest land, too, pays best in grass, for it produces a valuable crop without the expense of tillage; it is, also, for that reason, a more secure investment for the landlord; and the lower the price of corn, the stronger will be the motives for retaining it in its natural state. Were it to be presumed, that if the poor soils were returned to grass, the increased quantity of pastuage would compel the holders of the richer meadows to convert them to tillage, the argument would still fail; for poor land, in pasture, will not fatten any animal; and there are large tracts of such soils, now producing considerable arable crops, which, under grass, would not feed two sheep an acre.

It should also be remarked, that a material portion of the most productive corn land in the kingdom consists of clay; which soil is not adapted to the growth of the bulbous-rooted plants and artificial grasses, which constitute so large a proportion of the crops of light soils, and which cannot be profitably grown except in conjunction with corn. By abandoning the cultivation of the poorer soils, we should, therefore, lose the benefit, not alone of the grain, but also of the tares, turnips, pease, potatoes, and other fallow crops now produced on them, and without the aid of which it would be no longer possible to rear cattle sufficient for our consumption.

In order, however, to soothe the apprehensions of the landlords, the economists assure us, that the utmost amount of regular importation cannot be expected to exceed 3,500,000 quarters of grain of every denomination *. The actual quantity imported has already reached that standard; and that, let it be observed, when there was no permanent encouragement to the extension of foreign cultivation for the supply of our market †.

* See the Edinburgh Review, No. 88, Art. on Mr Jacob's Report on the Trade in Corn.

† The importation of foreign grain (exclusive of Ireland) amounted in the year 1831 to 3,529,860 quarters.

But assuming that as the maximum to be deducted from our growth, and even supposing that the poorest soils now cultivated in this country produce, upon an average, so much as 28 bushels, or 3½ quarters per acre of all kinds of corn, it would require 1,000,000 acres constantly under such crops to raise that quantity; and, as it can only be grown alternately with green crops, or fallows, 2,000,000 acres of land would be thus thrown out of cultivation: the total produce beyond the value of the mere pasture, amounting, on the most moderate calculation, to L. 12,000,000, would be lost to the country; the receivers and farmers of that land would be ruined; their capital rendered inoperative; their tradesmen deprived of the benefit of their expenditure; and their labourers driven to the parishes for support.

The proposed immediate reward of this sacrifice is cheap bread, and the prospective bonus an increased export of manufactures. But the poor can only obtain the means to purchase bread, at any price, by labour; and one-tenth of the number thus deprived of work, would suffice to produce manufactures enough to pay for the imported grain. The surplus thus thrown back upon the labouring population would therefore aggravate the distress which it is the object of the measure to alleviate. Nor let it be forgotten, that, while we calculate on an increased exportation of manufactures, and flatter ourselves that we have only to lower our prices in order to supply the world, neither our superiority in cheapness nor in workmanship can insure us that advantage, unless the respective governments consent to admit our goods into their markets. Russia has been foremost in the warfare of duties and prohibitions, notwithstanding that we already take of the produce of her land an immense amount in hemp, flax, tallow, and timber; and, from the anxiety lately manifested by other states to improve their own manufactures, and the jealousy entertained of England, it does not seem probable that our present liberal system will be hastily adopted. Field labour is the only work at which man has not been nearly superseded by machinery; and, even that may not long withstand the innovations of science; but, while it yet remains to afford subsistence to our peasantry, we should be cautious how we hazard it for the uncertain benefit offered in exchange.

Supposing, however, foreign governments to be solely influenced by the tenets of the modern school of political economy; that they would yield their prejudices to the force of argument, and admit our goods on equal terms with their own; still the consequence assumed by the advocates of importation,—namely, that the stimulus given to foreign agriculture, by the demands of this country, would so increase the price of corn, and consequently of wages, abroad, as to afford to our presumed superiority in skill, all the advantage of an equality of cost, while it would extend the consumption of our goods beyond the mere returns for grain,—would yet remain to be proved. Its probability may be judged of by the following considerations.

If we advert to the habits, and the agricultural system of our neighbours, we shall find that, throughout Poland and the greater part of the Russian provinces, whence are drawn our chief supplies of foreign grain, the feudal state of vassalage still prevails. The landowner is not only lord of the soil, but of its tenants; and it is cultivated, for his account, by serfs, who are attached to the land, and bound to labour for a mere subsistence. There is no middle class. The capital required by farmers in this country is there unnecessary. The possession of the ground is nearly all that is requisite; and a very moderate return repays the expense of cultivation. A rise in price occasions no increase of the peasant's wages; no advance of rent; and, in fact, when importation is permitted here, the prices of corn in the Baltic ports are regulated by those of Mark Lane. The lowest rate of our markets will always enable the Polish and Russian growers to supply us; and the highest will not enable their peasantry to consume our manufactures. The wealth that would flow into those countries would not be diffused among tenants and labourers, but would be absorbed by the great land proprietors alone, by whose probable increase of consumption of our manufactures we could not be materially benefited *.

* The writer of this note can affirm, of his own knowledge, that, in the years 1809, 1810, and 1811, when wheat had risen in this country to 113s. the quarter, and on the Continent in an equal proportion; and when there was an immense exportation of grain from the Baltic, it was with the greatest difficulty that sales of British manufactured goods were effected at

As foreign countries already take a large quantity of our manufactures, it is indeed only reasonable to suppose that a cheaper supply would occasion some greater demand, but not in exact proportion to the decrease of price. The error of theorists in commerce lies in calculating upon consumption always bearing a relative proportion to cost, as if a man must necessarily wear two coats, or eat two loaves instead of one, because he can get them both for the former price of one. But, even admitting that theory to be correct, still labour, to be beneficial, should be productive. The value of exportation does not consist so much in its amount as in the return obtained, and we shall toil in vain if that do not afford a fair remuneration.

The wealth of a nation is composed of its productions; and, after the wants of its population have been supplied, the surplus is all that is applicable to the purchase of those foreign commodities which the people may require either as articles of necessity or of luxury. Therefore, the more of those articles they can procure in exchange, the richer will they, and consequently the nation, be. Although, in their gross amount, all those commodities are virtually bartered, and the balance of the excess on either side is all that is actually paid in the precious metals, yet, in detail, their value being estimated in money, it is plain that the higher the price at which we sell our goods, the more of those of other countries do we obtain for them. It follows, therefore, that unless the money price, or exchangeable value of foreign produce, should fall in proportion to the reduction contemplated in our manufactures, we could not gain by that reduction. Thus, suppose that we now receive a certain quantity of wheat in return for one yard of cloth valued at 20s., and also suppose that, by the importation of that corn, we so reduce the cost of labour that we can sell the same cloth for 10s. and that the foreigner would consent to take double the quantity that he now does, yet, if he do not also lower the price of his wheat, the whole benefit of reduction would be his. That he will not lower his price, is proved by the concurrent testimony

Dantzic; although the navigation of the Vistula into the very heart of Poland was then unobstructed, and British goods circulated freely throughout every part of the Continent, notwithstanding the Berlin and Milan decrees.

of all the statements in favour of unrestricted importation *; and thus while, by the cheapness of our goods, we incur the risk of overstocking his markets, we act upon the certainty that an equivalent reduction in the price of his wares is hopeless. Wealth consists in the accumulation of commodities; but if we barter goods for corn, which we might ourselves grow, we not only gain that which we do not want, but we actually throw away the goods which we might have kept for our own use. Did this apply only to corn, the remedy would be in our own hands; but it refers also to the other products of the Continent —the flax and hemp, the tallow and the timber, which may be regarded as articles of greater necessity, inasmuch as we do not produce them in sufficient quantity, and which the free importation of grain would tend to raise against ourselves. There would still, indeed, be an advantage in any additional occupation for our manufacturing population, even although there were no addition to the national stock of wealth; but then the remuneration must amount to the full measure of the labourer's support, and it must be a real increase of employment, without detriment to any other class, and not a mere exchange of industry,—otherwise, neither the manufacturer nor the nation can be a gainer.

The justness of these observations is proved by the events of the last three years; for, notwithstanding an unprecedented reduction in the cost of our manufactures, and a large importation of corn, the foreign markets have been glutted by no very extraordinary excess of our exports, without any corresponding fall in the price of imported goods. The stagnation of demand abroad has recoiled upon our internal trade, and occasioned a reduction of wages, which has necessarily contracted our home-consumption. The effect of this has been a still farther reduction of the price of labour; and thus this boasted increase of foreign trade, instead of having had a beneficial effect upon the national industry, has involved the manufacturer, the agriculturist, and the labourer, in one common ruin.

One main object of political legislation is to compel the unproductive to contribute to the support of the productive

* See Mr Jacob on the Agriculture of Poland and the German States.

classes of the community. The engine employed to effect that purpose, is a given direction to labour—and the better that labour is rewarded, the more effectually is the object attained; for the industrious class contributes, in return, in proportion to its means of consumption to the support of the independent class, and those means are again enlarged by the consumption itself. Production thus causes reproduction; but the first impulse is wages, and the higher those wages the stronger will be their impulse. A high rate of wages is the real source of individual wealth, and of national revenue: it calls into action an amount of capital, which a lower standard leaves dormant; it quickens the circulation of money; stimulates the industry of the country, and extends employment to every class of the labouring community. Not only does it increase the consumption of our own commodities, but of those also of other countries; and experience shows that the amount of foreign demand for our manufactures, depends less upon the price at which we can sell our own goods, than upon that which we can afford to pay for theirs. By circumscribing our agriculture, a large amount of active capital would be rendered inoperative; wages would be kept below the level of just remuneration; and, our means of purchase being diminished by the reduction of the profits on capital and labour, it would be found that, merely to sell cheap, would not increase our foreign trade; while the attempt to reduce it, at the expense of the landed interest, would diminish home-consumption, injure the revenue, and augment the pressure of the public debt.

The proposed advantages of low prices consist in additional employment to our manufacturing population,—a general reduction in the cost of all articles of our own produce,—and an increase of home-consumption. On these it has been already observed, that, unless we obtain the supply of foreign markets to a greater extent than our importation of foreign corn, no additional employment can be thereby afforded to our manufacturers; for the corn we consume is paid for in goods, if grown upon our own soil,—and by obtaining it from abroad, we only deprive our husbandry of the benefit of its production: that, if the artificer's remuneration be reduced in proportion to the reduction in the price of food, he will not be enabled to pur-

chase more than formerly; and that, if the manufacturer be compelled to pay wages in a higher proportion than the value of corn, he will lose the advantage on which depends his expectation of increased foreign demand. From all which one of these two consequences must follow: either the labourer must be enabled to purchase commodities beyond his common wants, by higher wages than the proportionate value of corn,—or by a proportionate reduction of his wages, he will be left in the same situation as before: therefore, as, in the one case, the manufacturer would lose the supposed custom of the foreigner, and, in the other, that of the labourer, "*an increase of our foreign trade, through the effect of low wages, and of home-consumption, from the same cause, are incompatible.*"

A foreign writer, in support of the argument in favour of cheap bread, says,—"Quiconque aura dépensé dix écus de plus en pain, dépensera dix écus de moins en viande, en bièrre, et sans calculer que le boucher et le brasseur eux-mêmes sont obligés de consommer moins; que d'autres souffrent de leurs épargues, et sont par consèquence obligés de restreindre leur dépense*." He would be right with regard to the owner of the ten crowns, if they were possessed through an already acquired fund: but, if the means of obtaining them consist in labour, and if the value of that labour be estimated in corn, it must be quite immaterial to the labourer whether the bread cost ten crowns, or one.

An increase of home-consumption, founded on the hypothesis that it proceeds in an inverse ratio to the diminution of cost, necessarily supposes that the present means of purchase will still exist, whatever may be the future depression of prices. But a material portion of those means arises out of a high price of commodities; as, for instance, the rent of land, which is regulated by the value of corn; the profit on the employment of capital which must be brought into action in a greater or less degree as the prices of commodities are high or low; and the wages of labour. It follows, therefore, that if the cost of corn and of manufactures be reduced, so also must the rent of land, the profit on capital, and the wages of labour; and, as these are the

* Schmalz, Econom. Polit. quoted in the Edinburgh Review for January 1830, article on Political Economy.

great sources of income, the same means of purchase would no longer exist. The reduced income might purchase as many commodities as formerly, but not more: thus the advantage to the productive classes would be illusory, and the substantial benefit would be reaped by the annuitant alone, whose only value to the state, in an economical view, consisting of his expenditure, is unimportant to the nation whether that be accomplished through high prices or low.

So far as regards the labourer, all the arguments in favour of cheap bread prove nothing more than the truism, that he would be thereby benefited, *provided his wages were not reduced to the same standard.* But the equally undeniable truths are lost sight of,—that, while the population is equal to the demand for labour, bread and wages will ever find the same level; and that, as our population now exceeds that demand, every reduction in the value of corn must be inevitably followed by an equal reduction in that of labour: the labourer, therefore, is not interested in the question. But the annuitant, who can calculate on receiving the same annual income, whatever may be the state of trade and of agriculture, may well vaunt of the advantages of cheap bread. He is sure to profit by every reduction of price, and, therefore, it is no wonder that he demands the free importation of corn. Whatever may be its effect on the general prosperity of the country, it cannot injure him. It is hard, however, that the experiment should be made at the risk of the landowner. It is not just that any exclusive burden should be, either directly or indirectly, thrown on the land. If, therefore, the rent of land is to be lowered, as it necessarily must, by an unrestricted importation of foreign corn, it is but fair that an equivalent should be granted in a reduction of the taxes which press exclusively upon the owner of the soil. This can only be effected, in my opinion, by a proportionate reduction in the interest of money; and those who deprecate that measure are bound, by every principle of impartial justice, to uphold the claim of the landholder to protection from any forced reduction in the value of his property.

Doubtless, the cost of provisions regulates, in a great measure, that of all articles that are produced by manual labour. It may be equally true that the cheapness we can produce every manu-

factured article, the greater would be their probable consumption, and, consequently, the greater the scope for our industry in that particular branch. It must therefore be admitted, that cheap bread would be a national advantage, *provided we could obtain it without injury to our agriculture.* But land is the staple upon which we can the most confidently rely for the employment of our labouring population, and our agricultural prosperity should not be hazarded by any speculative measure of remote advantage, without some better security for the equivalent proposed by the economists than the bare probability that the abandonment of our husbandry would be followed by a more than proportionate increase of manufacturing industry, and that British capital would not be transferred to a foreign soil.

It was many years ago the opinion of a statesman, whose policy has been hailed by the economists as the most enlightened of this liberal age, "that there is no effectual security, either in peace or war, against the frequent return of scarcity approaching to starvation, such as of late years we have experienced, but in our maintaining ourselves habitually independent of foreign supplies. Let the bread we eat be the produce of corn grown among ourselves, and, for one, I care not how cheap it is,—the cheaper the better. But, in order to secure a continuance of that cheapness, and that sufficiency, we must ensure to our growers that protection against foreign import which has produced those blessings, and by which alone they can be permanently maintained."* Other nations may rival or excel us in the productions of art, but even if we could always maintain our superiority in manufactures, their municipal regulations might deprive us of that advantage; but the products of the soil are of unalterable value, and, while our agriculture receives due encouragement, it will be out of the power of rival states to deprive us of that surest source of wealth and independence.

I. F. B.

* Mr Huskisson's Letter to his Constituents, in 1814.

ON STRAW AND HAY CUTTING MACHINES.

THE practice of cutting hay and straw as a preparatory process for the food of horses and cattle, has long been known in the southern parts of our island. Its reception into Scotland, however, has been slow, and only admitted with that cautious experience for which we are perhaps too much distinguished. Hence, it is only of late years that any progress has been made with it in this part of the kingdom. For the introduction of the chaff or hay-cutter, even in its present limited extent, we are mainly indebted to those enterprising individuals who have, with praiseworthy exertions, rendered so many benefits, and given such facilities to the intercourse of the country,—we mean stage-coach proprietors. These men, like all others engaged in business, have encountered great competition, though, in their particular case, that competition arose, in the first instance, on quite a different element from what they were accustomed to travel. The safety of steam, for the purposes of locomotion on the water, and the confident certainty with which steam-vessels can accomplish their destined voyage, while, at the same time, the passengers can enjoy more ease, and much more comfort than sailing vessels can bestow, naturally led every passenger who studied his personal convenience, and who felt assured of the certainty of attaining the end of his journey with the precision of a mail-coach, to travel in steam-vessels. The immediate effect of this marine competition was the lowering of the fares by the stage-coaches. This reduction of fares drove coach-proprietors to every alternative that might tend to lessen their necessary expenditure. As the keep of horses forms the heaviest item in the expenditure of these establishments, the reduction of it became a most desirable object, and was soon reduced to practice, through the use of straw or hay cutters. The utility and economy of preparing food for horses was well described by our valued correspondent Mr Dick, veterinary surgeon, in an interesting paper which appeared in the third volume of this Journal, p. 1024, and which, we are happy to learn, has attracted very considerable attention in the country. None require to study economy in the maintenance of horses more than farmers, and were they

to turn their attention to the preparation of horse-food, the trifling additional trouble which it would create, would be more than compensated by a sensible saving in produce.

But coach-proprietors are threatened with still greater competition by locomotive steam-engines on the public roads, which will travel, it is alleged, at one-half of even the present reduced fares. In that event, the horses must bid "a last and long farewell" to the roads; and the boast with coach-proprietors will then be, not to keep the best actioned horses on the road, but to possess the most powerful boilers.

The first form that the chaff-cutter (as it has been called) seems to have taken, was that of a jointed chopping-knife, and which is still partially in use. By degrees, the instrument took more the form of a machine, consisting of different members adapted to perform the various parts of the process which were considered necessary to the due performance of the work. Some of these machines were very complicated, arising from an impression that an essential property of the machine was, that the body of hay or straw should remain at rest during the action of the knife or cutter, and to move forward only, during the interval between the strokes. Many varieties of the machine were made under this false impression,—an impression for which there may, indeed, have been some ground; for, in all the machines of that class the cutters revolved in a plane, they being in general attached to the fly-wheel, and this form the machine still prevails in many parts of England.

Some years ago, the straw or hay cutter took a new form, under the hands of a person who seems to have taken out a patent for the improvement. In this, the cutters are made to revolve, by being fixed upon a skeleton cylinder on the fly-wheel shaft, the hay being brought forward by a pair of feeding-rollers, as had been done on some former occasions; but in this case, the progressive motion of the hay was constant, which enabled the inventor to dispense with the machinery required for producing the intermitting progress of the hay. Immediately on passing through the feeding-rollers, the hay is protruded through a cutting-box, the face of which is worked off to an interior cylindrical surface. The cutters, which may be of any number from one to four or more, are placed dia-

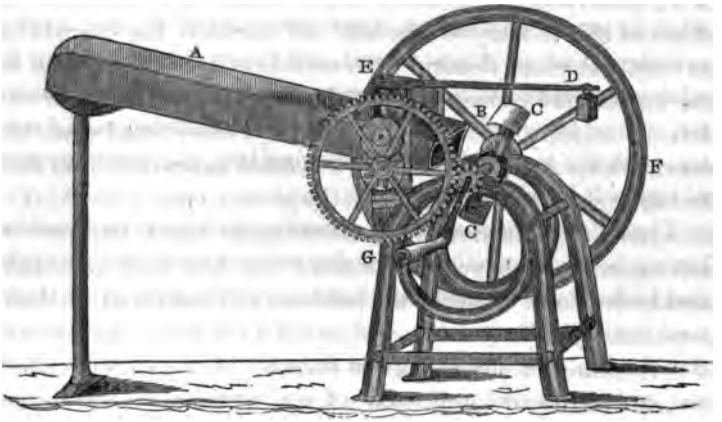
gonally upon the skeleton cylinder. The diagonal position is considered necessary for the cutters, as they thereby pass through the hay with an oblique cut, producing an effect resembling that of shears, and which prevents the shock that would attend the stroke of the cutters if the whole length of its edge were to come in contact with the hay at the same instant.

From experience, however, it is now found that the oblique position of the cutters is attended with considerable inconvenience to the workmen, arising from the difficulty of setting the cutters when they have been removed for sharpening, or for any other purpose. The difficulty attending this operation may be easily conceived, when we consider that the edge of the cutters, when in proper adjustment, must form part of the section of a cylinder, or of an elliptic curve; and hence the difficulty of its adjustment, with sufficient accuracy to ensure good performance; for, unless the edge of the cutter come into all but actual contact with the lower edge of the cutting-box, the lower stratum of hay will be left uncut.

The defective position of the cutters in the hay-cutting machine having been suggesed to Mr Slight, of the firm of Messrs Slight and Lillie, engineers, and model and machine makers to the Highland Society of Scotland, he has rectified the defect, and has produced a machine possessing the property of having the edge of the cutters parallel to the axis of the fly-wheel on which they are mounted; and in order to retain the advantages of an oblique passage through the body of hay, the cutting-box is elongated into a nozzle, which is twisted until the mouth of it assumes an angle of about 30°. The face of the nozzle is worked off as in former machines to an interior segment of a cylinder, concentric with the shaft of the fly-wheel. By this arrangement, which is just reversing the former position of the cutting parts, the entire efficiency of the machine is retained, while its construction is simplified, the price proportionally reduced, and the keeping it in order also rendered much simpler.

The annexed cut exhibits one of these improved machines, as manufactured by Messrs Slight and Lillie, with framing made entirely of cast-iron. A is the feeding-trough, the rollers being only partially seen. B is the nozzle or cutting-box. C C the cutter-bearers, with the cutters attached by their bolts. D

is a lever and weight, which, through the medium of the bridge E, keeps a constant pressure on the feeding-rollers, to counteract any inequality of feeding. F is the fly-wheel for equalizing the motion; and G, the handle to which the power is applied. The small pinion on the fly-wheel shaft gives motion to the spur-wheel, which is mounted on the shaft of the lower feeding-roller, and carries also the lower feeding-pinion. This last pinion works into the pinion of the upper roller, and both being furnished with very long teeth, they thereby admit of a limited range of distance between the rollers, according to the quantity of feed.



With one of these machines, a man, assisted by a boy to feed in the hay or straw, can cut at the rate of 8 stones per hour; and that quantity of cut hay is found to be sufficient for sixteen horses for twenty-four hours.

The machine of which the above is a figure and description, combines, in an eminent degree, expedition and efficiency, with ease to the workman. We do not think it can be made of a simpler construction. These advantages arise in some degree from the very superior workmanship which Messrs Slight and Lillie bestow on every piece of work which comes from their manufactory. Those who have had an opportunity of seeing the series of models which they have made on a relative size for the museum of models belonging to the Highland Society of Scotland, will, we are confident, corroborate what we have said

of their superiority of workmanship. The price of these straw-cutting machines is within the reach of every small farmer. They are cheap, when we consider their utility; and being made wholly of cast-metal, they will last the lifetime of any man.

ON A NEW REAPING MACHINE, INVENTED BY MR JOSEPH MANN, OF RABY, NEAR WIGTON, CUMBERLAND. With a Plate. *By Mr JAMES SLIGHT, Curator of the Museum of Models of the Highland Society of Scotland.*

THE undeviating progress of improvement in the agricultural affairs of this country for the last half century, has brought in its train a constant demand for a corresponding improvement in the implements connected with that important branch of the national industry. Hence, since the days when Small made his valuable experiments, that led to a decided improvement in that first of agricultural implements—the plough; and when Meikle achieved a *chef d'œuvre* in the thrashing-machine; the spirit of improvement which was thus excited has been kept alive with unabated ardour. Whilst the followers of these men have been progressively adding to the efficiency of these two powerful arms of agriculture, they have been as successful in most of the other branches of the art, until, with a few exceptions, we now see the rude implements of our ancestors changed into more manageable and efficient forms,—some entirely remodelled, and others, as in the case of the broadcast sowing-machine, exhibiting new applications of mechanical skill.

These changes, brought about by the energies of judicious mechanics, under the fostering agency of patriotic bodies of individuals, who have taken an active part in the improvement of their country, and accompanied also by the labours of science, —have produced the most beneficial results on all agricultural implements and machines. The improvements of agricultural mechanics have, in their turn, become powerful auxiliaries to the scientific principles which Davy and others have instilled into the management of rural affairs, by facilitating the labours of the field, and giving the precision of effect that follows mechanical operations; they tend, at the same time, to shorten the

processes of labour, and to abridge the risks which attend the crops in their different stages in a variable climate.

The pages of this Journal have already exhibited many of these improvements in the various departments of farming implements; but there is still one which, though not unnoticed, remains in an imperfect form. The sickle has apparently, from the earliest ages of the world, been the only instrument adopted for that important operation, the cutting down of the crop. This operation, than which, none in the whole course of the season claims more of the care of the agriculturist, nor requires from him greater promptitude and decision, along with strenuous exertion, to enable him to secure the hard-earned fruits of his industry; yet, with all the importance of a more expeditious mode of reaping continually pressed upon us, our mechanics have failed in fulfilling this desideratum. It is indeed surprising that, throughout the whole world, little or no change has been effected upon an operation so important, for the last 3000 years. The sickle of the Egyptians, as depicted upon their tombs, is observed to be not very dissimilar to that of our own times, and all nations who have cultivated the cereal grasses for food, and have, at the same time, possessed the use of metals, seem to have followed the same example. This circumstance is certainly a remarkable one; and while so many and so varied and difficult operations are performed by the power of machinery, it is matter of even surprise that a perfectly efficient reaping-machine has not yet been effected.

During the last thirty years, many attempts have been made, and high premiums have been offered for the production of a perfect reaping-machine, and some of those brought forward have possessed very considerable merit. Among the early machines of this class, Mr Smith's of Deanston stands in the first rank, and that of Mr Gladstone of Castle-Douglas also claims attention. Besides these, as is well known, a number of others have appeared, possessing various degrees of merit; out of the whole has lately sprung that of Mr Bell, which has been noticed in a late number of this Journal.

In all these attempts, but especially in those that have been in any degree successful, there seems to have occurred, with slight exceptions, but two modes of applying the cutter to the

corn,—these are the revolving-cutter acting like a circular saw, and the lever-cutter acting like shears, both of which have their peculiar merits, and both seem to be efficient in as far as the single act of cutting is concerned; but it is in the more complicated process of gathering the corn, and depositing it in regular order after it is cut, that these machines have in some degree failed. It therefore follows, that to this point in the process of reaping by machinery, the attention of the mechanist should now be directed, and in this field there seems yet to be ample room for the exercise of the ingenuity of man.

The object of this communication being to place before the public a new competitor in the *harvest-field*, Mr Mann, of Raby near Wigton, Cumberland, I shall, in the first place, before describing it particularly, notice the trial that was made of his machine at Kelso. This gentleman, under the auspices of the Highland Society of Scotland, brought forward a new reaping-machine, which was exhibited in the department of implements at the General Show of Stock held at Kelso in October 1832. The Society previously guaranteed to him a sum of L. 10, to defray the expense of transporting the machine to Kelso, leaving to its own merits the chance of obtaining such a premium as the judges of the Show might award.

In consequence of the early harvest of last year, the crops had been almost entirely cut down in that neighbourhood before the day of the Show. The only piece of standing corn to be found was at the distance of four miles from Kelso, and thither the machine was transported, in order to be seen in actual operation by a committee of the judges. It happened that the field of operation was a small patch of unripened oats, much straggled, and which had been considered so worthless that cattle had been allowed to traverse it. It may therefore be conceived, that the trial was disadvantageous to the machine; but, under all the circumstances, it performed in a tolerably satisfactory manner. The corn was fairly cut, and it was considered by those who had seen other reaping-machines at work, to lay the swathe more regularly at right angles with the line of direction than had been obsreved of previous machines. In going up hill (for the ridges lay at a high inclination), it was observed not to perform so well as down hill and, owing to some imper-

fection in the construction of the frame-work, it appeared also to work imperfectly across the ridges. Upon the whole, the trial of the machine, although it called forth much general approbation, was not of such a satisfactory nature as to merit the award of a premium, further than an offer from the Society of an additional sum of L. 10 to Mr Mann when he produced a model of the machine, with such improvements as might occur to him.

Before giving a detailed description, it may not be uninteresting to trace the steps by which Mr Mann has brought his reaping-machine to its present form. To those who may be treading in the same path, Mr Mann's opinions may, perchance, be of service, whether as beacons to guard them from foundering on what may be errors, or as guides to direct them to what may be useful. The facts are collected from his own communications.

In early life, Mr Mann seems to have directed much of his time to the pursuit of mechanical operations, and in the year 1820 brought out his first model of a reaping machine. This appears to have been on the same general principles as the one now before us: it was mounted on three wheels, furnished with six cutting knives, six vertical gathering rakes, and also a second revolving rake, for stripping the former of the collected corn; and the draught was applied, as in the present instance, at one of the angles of the frame. This model was exhibited to the Abbey Holme Agricultural Society, who expressed their approbation of it, and advised a two-horse-power machine to be made, with some proposed alterations, one of which was, that the horses should propel instead of draw the machine. Of this last proposition, however, Mr Mann seems to have entertained no favourable opinion. In 1821 the new machine was exhibited in model, before a numerous meeting of gentlemen; and, in the harvest of the following year, a full-sized one was brought forward in a working state; but it was found that, in fulfilling the numerous conditions laid down, the machine had become so complicated, that its utility was now doubtful. Accordingly, we find that after a very short trial it was laid aside. Nothing farther seems to have been done till 1826, when the machinist seems to have returned to his favourite point of *drawing* instead of *pro-*

pelling the machine; for in that year he again brought it forward, nearly in its present form; and it was again attended with only partial success. From that period, Mr Mann seems to have been occasionally adding such improvements as from time to time occurred to him; and now, in summing up, he avers, that his machine contains the four principal points of a good reaping machine:—1*st*, It preserves the parallelism of the line of draught though drawn from an angle; 2*d*, The polygonal cutter; 3*d*, The gathering process performed by revolving rakes; and, *lastly*, The process of stripping the rakes in such a manner as to lay down the cut corn in a regular swathe. The machine, as now executed, cuts a breadth of 3½ feet at each turn, is capable of cutting down 10 acres in a day of ten hours, and is drawn with ease by one horse.

Such is a brief outline of the history of Mr Mann's reaping-machine, which is here offered without any remark; but trusting that, as it seems to possess some degree of merit, it may form a step in the solution of the problem that has so long occupied mechanists, and which, it is hoped, will ere long be finally demonstrated, and the reaping-machine be deemed as essential to a well regulated farm, as the thrashing-machine has been for many years past.

Plate I. Fig. 1. is a geometrical elevation of the machine, and Fig. 2. a horizontal plan. The same letters of reference are used for both figures.

The cutting process is performed on the revolving principle; but instead of a circular cutter, one of a polygonal form has been adopted, of twelve equal sides. By the adoption of this form of cutter, the action on the standing corn is somewhat different from that of the circular cutter; with the latter, the cutting edge is continually in contact; but with the polygonal cutter, the effect is produced by a very rapid succession of strokes, arising from the inclination of the cutting edges of the polygon to each other; for, as can easily be shown, the angles at *a a*, in Fig. 3, being farther from the centre of revolution than any point taken in the side comprehended between the points *a a*, any body, as a stalk of corn, opposed to the cutting edge, will be forcibly acted upon when the angle is passing the stalk; but if passing without completely separating it, the

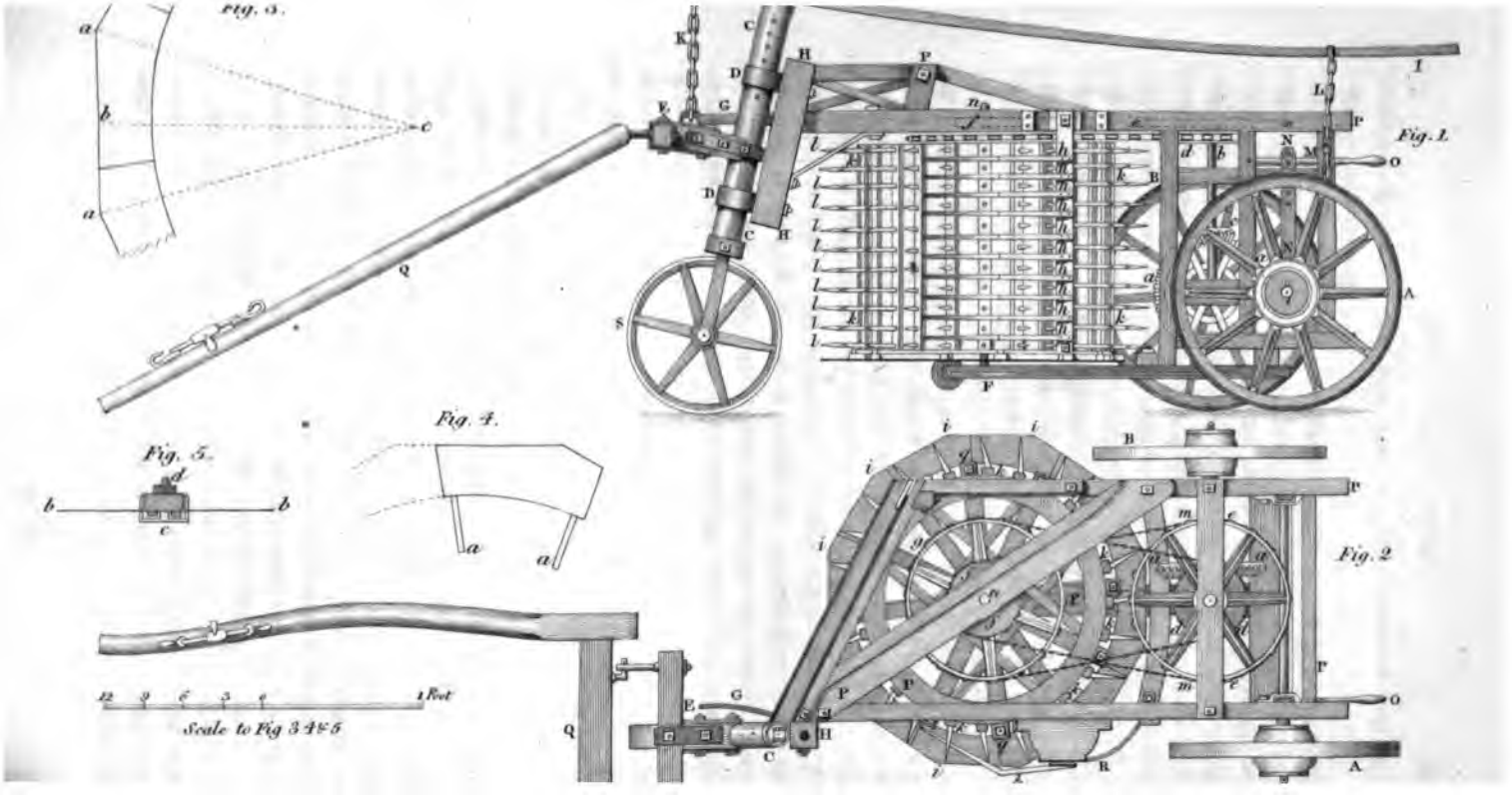


Fig. 3.
Fig. 1.
Fig. 2
Fig. 4.
Fig. 5.
Scale to Fig 3 & 5

cutting edge will then recede from it, until the succeeding angle comes into contact.

When the cutter has a progressive motion, this effect is altered only in degree; for still the first half of the side from *a* to *b*, will produce little or no cutting effect, while the remaining half will give a species of stroke somewhat resembling that of a scythe, which, it is presumed, may produce a greater effect than if the edge were continually in contact, especially against a flexible body like the culm of the cereal grasses. The cutter *i i* Fig. 2. is formed in twelve separate segments of thin steel plates, fixed upon the extremities of a corresponding number of arms attached to a vertical shaft. The joinings are formed by the ends lapping over each other, the joints being situated posteriorly to the angles of the polygon in relation to its motion of revolution. The segments are fixed to the arms by means of slender sliders, which are rivetted to each end of the segments, and, passing through a clasp in the end of the arms, they are secured in pairs by a screw-nut. Fig. 4. shews one of the segments with its sliders *a*, *a*. Fig. 5. is a cross section of an arm and clasp, embracing its two contiguous sliders, *b b* being the cutter, as seen edgeways with the sliders, *c* is the clasp, and *d* the nut which draws up the clasp upon the sliders. By this arrangement, any one, or the whole of the segments can be removed, and replaced in the course of a few minutes. In calculating the motions which are introduced to drive the cutters, it appears that, when the machine travels at the rate of $2\frac{1}{2}$ miles an hour, the cutter will make 175 revolutions per minute.

The next operation is the gathering, which, in this machine, has assumed a new form. A skeleton cylinder is made to revolve upon the vertical shaft of the cutter-frame: it is mounted with a set of vertical rakes, to the number of 25, each armed with 9 wooden teeth, and one of iron, for greater strength, set next the cutter. This cylinder, with its rakes, revolves concentric, and in the same direction with the cutter, but at a greatly reduced velocity, making only 28 revolutions per minute, or nearly one to seven of the cutter. Its office is to collect the stalks of corn as they are cut, and carry them round to the near side. In order to discharge the contents of the rakes, an ingenious and simple contrivance is adopted, in the form of a

comb attached to the near side of the machine. The comb consists of eight teeth marked with the letters *hh*. These teeth standing in the spaces between those of the rakes, strip the latter of their collection of the cut corn, as they successively arrive at the point of contact with the comb. The corn by this action is deposited in a continuous swathe, nearly at right angles to the line of direction. To prevent any of the corn getting within the teeth of the comb, a line of thin iron-wire is twisted round each horizontal row of teeth, forming a number of bands standing about two inches from the roots of the teeth, too minute to be shewn in the figure. As the points of the teeth of the comb stand always within the circles formed by the wires, they catch every straw that is taken hold of by the rakes.

The frame-work of the machine is of a trapezoidal form, having the rectangles in the hind part, and the acute angle in front, to which the draught is applied. The hind part is supported upon two carriage wheels AB, and the fore parts are chiefly supported on the castor-wheel in front, which is attached to the moveable stem C, made to turn in the iron collars DD. The arm E, to which the horse-shafts are applied, is firmly attached to the stem, so that, in the act of turning, the castor-wheel follows the direction of the horse-shafts and causes the machine to turn round in a very small space. Besides these three principal wheels, there is a fourth, in the form of a small roller, working in the extremity of the perch F, which is intended only as an incidental support to the cutter and rakes, the common shaft of these having its footstep in the extremity of the perch. As already stated, the horse-shafts are applied to an angle of the frame work; which becomes necessary that the horse may go before the machine, walking by the side of the standing corn. Although the draught is thus applied to an angle, the effect which might be anticipated, of throwing the machine out of the parallel line, and causing it to move in the direction of its diagonal, does not follow; for in practice, it is found that the machine has no tendency to deviate from a line of direction parallel to itself. This, it is presumed, is effected partly by the offside wheel being in advance of the other, and partly by the tendency to deviation being counteracted by the resistance of the standing corn against the cutter.

The motion of the active parts is communicated by the off-side carriage-wheel, on the axle of which is mounted a bevelled wheel *a*, of 46 teeth, and on the upright shaft *b* is mounted a pinion *c*, of 20 teeth, working in the former. The same upright shaft carries two pitch wheels, the one *d d*, of 8 teeth, which drives the rakes, and the other *e e*, of 28 teeth, in Fig. 1. shewn only in dotted lines, for driving the cutter. On the top of the cutter shaft is fixed the pitch-wheel *f f*, of 9 teeth, also shewn in dotted lines; and to the rake cylinder is attached the pitch-wheel *g g*, of 21 teeth. These two pairs of pitch-wheels being respectively connected by their chains, give motion to the two principal actions of the machine. The subsidiary motions are effected in the following manner. The projecting iron bar G is fixed to the pendant bar H of the frame-work. The lever II, is supported in its fulcrum which turns on the head of the stem; and a connection is formed by the chain K, between the end of the lever and the fore part of the machine, by means of the bar G. By this combination, together with the chain L, the director of the machine has it in his power to raise or depress the fore part and cutter at pleasure. There is the same facility of raising or depressing either side of the cutter to suit the rounding of ridges, and for running in deep furrows. For this purpose, the axles of both wheels of the carriage are supported in sliding bars with guide rods NN, and by means of levers, one only of which is shewn at O, the director has the power, at any time, of altering the inclination of the cutters with reference to the horizon, in the transverse direction of the machine.

The following additional reference is given to parts not already noticed in the description:—

P P, &c., The parts of the frame-work. Q, The horse-shafts. R, An iron-brace supporting the lower end of the comb. S, The castor-wheel, with its shears as attached to the stem. *m*, The pitch chains. *n*, Upright shaft of the cutter and rakes. *o o*, &c., The arms of the cutter and cylinder. *p*, The upper rim of the cylinder. *q q*, &c., The ends of the arms to which the cutters are attached.

ON AN ECONOMICAL MODE OF APPLYING BONE-DUST AS MANURE FOR TURNIPS.

(To the Editor of the Quarterly Journal of Agriculture.)

THE immense quantity of bone-dust which is now annually used as a manure for raising turnips, and enriching fallow land, may reasonably excite an apprehension that all the bones of animals which are killed for the use of man, and which are allowed to die a natural death, will be inadequate to supply the demand for them as a manure. Bones of animals being applied to many other purposes besides that of manure, it is extremely probable that, were they as liberally used in agriculture on the Continent of Europe as they are in this kingdom, and were their use still farther increased in this country, that the demand would greatly exceed the supply; for, under present circumstances, a great proportion of the bones which are bruised into dust in this country, besides bone-dust itself, is imported from abroad; and, even with this great foreign supply, we find the price of bone-dust has risen in value in the market from 2s. 6d. to 3s. 6d. a bushel. An apprehension, therefore, of a scarcity of it in future appears to be too well founded.

In order to avert in some degree the evils arising to agriculture from a scarcity of so valuable a manure as bone-dust, and to keep its price within the bounds of moderation, I have endeavoured to use it in an economical method for the last two years, by which half the quantity usually employed is quite sufficient to insure a heavy crop of turnips.

The quantity of bone-dust usually applied is two quarters per imperial acre: I use only one quarter per acre; but I always mix the bones with coal-ashes. These ashes may be procured in towns and villages, at a price not exceeding 5s. per ton; and the quantity mixed with the bones depends in a great measure on the quantity of ashes that can be obtained;—the more of course the better, but it should never be less than one or two quarters per acre.

The ashes are put in a dry place, under cover, such as a cart-

shed, or out-house, and riddled as small as the bone-dust itself. That which passes through the riddle ought only to be mixed with the bones. The bones should be very carefully and equally mixed through the mass, which will be best effected by frequent turnings with the shovel. The turnings also assist in drying the ashes, which, if they are not, they will not pass easily through the hopper of the sowing-machine. The ashes should be collected as early in the season as possible, that they may get thoroughly dried. After the bones are mixed with the ashes, the mass ferments, and evolves a considerable degree of heat, which subsiding, assists the drying of the ashes considerably. To expedite the drying of the ashes, when they cannot be procured early enough in the season, I would recommend their being strewed with a dusting of hot lime, while the mass is turning over, in the same manner that pickled wheat is dried with lime to render it fit for sowing. I never tried this expedient, because I always procured an early supply of ashes; but I feel confident it will answer the purpose. The compost is sown with the usual machine.

Turnips raised with this compost of bone-dust and coal-ashes, in the quantity alluded to, I have sold for £7 per acre, to be eaten off with sheep; and they always possessed the same characters of a close crop, firm root, and hardiness to resist the rigors of winter, that turnips raised with bone-dust alone evince. I believe it is the bone-dust which alone secures the crop of turnips, whatever nourishment the ashes may impart to the crop at the future stages of growth. Lest this be doubted, let the ashes be used alone, and a woeful falling off of the crop will inevitably ensue. Perhaps peat or vegetable ashes of any kind would be equally beneficial to mix with bone-dust as those of coal. It is known that any quantity of bone-dust above two quarters per acre, does not produce a corresponding increase in the bulk of the crop of turnips, though no satisfactory experiments have yet been instituted to ascertain how small a quantity of bone-dust alone is sufficient to secure a crop; but, I trust, I have discovered how small a quantity of it may be used with a commodity which is in the reach of every person, so as to secure a crop,—a result which may be considered as one step towards a right understanding of the properties of so valuable a manure.

It may not be irrelevant to mention here a substance which has been described by Professor Decandolle of Geneva, as a consideration of its properties may serve to explain the active energies of bone-dust as a manure.

Of all the different ingredients of which manures are composed, carbon is supposed to be that which holds the first rank as a food of plants; but it is only in a state to be the food of plants after it has united with the carbonic acid of the air. It is this compound, on being dissolved, which is taken up by plants as food. This substance was called *ulmine*, on account of its being first found in a diseased part of the elm; but M. Sprengel gave it the more general term of *humine*, because he found it to exist in soils.

Humine is a substance not unlike carbon, for which it has hitherto been mistaken. It is very soluble in spirits of wine, concentrated sulphuric acid, ammonia, and by heat in acetic acid; but it is insoluble in water, and water throws it down in all its solutions. It combines with all the salifiable bases, and forms the *humic acid;* but it has no acid taste, does not redden vegetable blues, and, like the gallic acid, it contains only carbon and water, without excess of oxygen. There is a strong analogy between humine and other nutritive substances, such as gum or fecula. It forms a humate with an alkali, which is very soluble in water.

All substances which contain carbon are dissolved in the water of vegetation, through the means of humine; and the dissolved mass is taken up by plants as food. Humine in combination with lime, ammonia, or potass, becomes soluble in soils or dung, and thus becomes the food of plants.

Keeping in view these properties of humine, I think the action of bone-dust may be explained; and important conclusions may be drawn regarding the state in which putrescent manures should be applied to the soil. It is well known that bones ground into *dust* soon undergo decomposition in the soil. The decomposition disengages the phosphoric acid, and the lime and animal carbon is left to be acted on by the air; and which, being converted into humine, readily forms a soluble mass with ammonia, lime, and acid of the bones. This dissolved mass [illegible] up by the water of vegetation, and becomes the food of

plants. Moreover, the frequent application of putrescent manures to the soil must accumulate a quantity of carbon in it, which will there remain in an inert state, till it is put into a fit state to be taken up as food by plants. Lime, bone-dust, or kelp, will render the mass of inert carbon active by the formation of soluble humine. The decomposition of vegetable substances is the best means of supplying the carbon which is to be converted into humine. Hence, then, we can explain how a fine black rich mould may become inert, or *deaf*, as it is termed, till it is limed; and also how it is that bone-dust raises heavy crops of turnips on such soils: hence also how it is that vegetable soils of an inferior nature, such as heathy, turfy soils, are improved by liming: hence we now see that the practice of applying the putrescent manures in a highly decomposed state to the land, is the state in which it contains the greatest quantity of humine in the same bulk of manure; and also that fermented dung being kept and applied to the soil in a *sappy* state, is the very best possible one to preserve the humine from waste during the process of preparing the dung for the land.

I sincerely wish that some able chemist will take up this very interesting and important subject, regarding the chemical action of putrescent manures in general, and of bone-dust in particular. By the mutual co-operation of the intelligent farmer and the acute chemist, results may be obtained which might greatly reduce the very heavy charge of maintaining the fertility of the soil, but without that fertility the soil would soon become a *caput mortuum*.

Before concluding, allow me to suggest to chemists the investigation of the nature of the change which is produced in the soil by the decomposition of animal bones, and what remarkable combination the substances of the bones enter into, to produce so active a manure as bone-dust undoubtedly is.

To assist in this investigation, I intend to make some experiments this summer with bone-dust in raising different kinds of turnips, and I shall carefully procure a little of the soil for chemical analysis.

G. B.

ON THE TITHE SYSTEM OF SCOTLAND.

ALTHOUGH a conviction that the parochial institutions of Scotland are superior to those of other countries very universally prevails, it rests rather upon a vague impression of their general excellence, and upon the admitted fact, that there is no country "so well conditioned" (to use the phrase of the late Lord Liverpool), than upon a particular knowledge of the structure of the institutions themselves. We believe, therefore, it will be alike interesting and useful to exhibit to our readers an account of them; and we propose to devote the present article to the Tithe System of Scotland. We are the more desirous of giving an account of this, because it affects very materially the prosperity of agriculture, and the condition of the agricultural population, which it is among the main objects of this Journal to promote, and because the urgent necessity of making some change in the tithe system of England and Ireland, renders it a matter of more than usual importance for the public to know by what means it has been placed on so beneficial a footing in Scotland.

The highly injurious character of a system of tithes levied in kind, and subject to constant increase with the extension and improvement of cultivation and with every addition to the capital vested therein, is now universally admitted. Independently of its pernicious influence in a moral and religious point of view, in creating and fostering discontent and evil passions, promoting dissension between the pastor and his flock, and thereby creating a formidable barrier against the efficacy of his ministrations, its effects, in a political and economical point of view, are very injurious. While leviable in kind, or by a composition liable to be increased at intervals, it operates as a tax on individual labour and capital, and in regard to a class of productions which it has been always the peculiar policy of this country to foster and protect. It is true that tithe is only *in part* a tax on labour and capital, but still it is prejudicial, as being so to any extent, while to the individuals who pay, it *appears* to be so to its *full* extent; and when paid by parties of

one religious faith to support a church propagating doctrines which they hold to be contrary to Scripture, it is attended with constant violence to conscience.

All these evils are avoided by the Scotch system.

Originally, of course, in Scotland, tithes were on the same footing as in the other Roman Catholic countries of Europe. The Scotch Church was indeed peculiarly well endowed; and what with their territorial possessions and their tithes together, the Scotch clergy, prior to the Reformation, are considered to have drawn *one half* of the *whole rental* of the kingdom. The tithe, however, had, before that event, been very generally diverted from its original purpose of maintaining a pastor in each parish. Out of about 1000 parsonages in Scotland, there were, at the Reformation, only 262, which were not appropriated to the support of bishops and their chapters, or religious houses. The bishops or religious establishments drew the tithes of the parishes whereof the churches were appropriated to them, under the burden of providing public worship thereat. This was done either by the appointment of a vicar, who drew vicarage-tithes, or, more commonly, by the services of a member of the chapter or religious house, the vicarage-tithes being generally, by the time the Popish Church was overthrown, appropriated as the parsonage-tithes had previously been. On the Reformation, the Nobles and Court assumed, that, by the annihilation of the Roman Catholic Church, the benefices fell as lapsed fiefs to the Crown, and, accordingly, parts thereof were obtained first in commendam, or under the device of the "Tulchan" system of appointment to benefices*, and then in perpetual fee, the

* This device was the appointment of a clergyman to a bishopric, abbacy, or other benefice, under a previous bargain with the lay grantee or the patron, that he was only to retain a fixed allowance, generally very moderate, out of the fruits of the benefice, and pay over the great proportion of the revenues to the lay grantee or the patron. These beneficiaries were called "Tulchan" bishops, &c. from the name given to a stuffed calf, which was in use in some parts of the country to be placed beside a cow, in order to induce her to part more readily with her milk to them who were really to enjoy it. This disguise was only adopted at the earliest stage of the process of appropriating the church revenues, as, after King James assumed the reigns of government, the right of the Crown to the whole of the church property was openly avowed and acted upon.

great benefices being converted into temporal lordships, and the parties obtaining right not merely to the territorial possessions of the religious establishments, in whose place they came, but to the tithes of the churches which had been appropriated to them. These parties thus became *titular* abbots, priors, parsons, &c. of the several benefices. They held their right to the tithes, subject to the same condition with which they were burdened in the persons of their predecessors, the *clerical* titulars, of providing public worship at the parish churches; but, being laymen, this obligation could only be implemented on their part, by paying a salary to a minister to serve the cure. So greedily rapacious, however, were the nobles, &c. who had thus obtained possession of the spoils of the church, that it was scarcely possible to wring from them the most scanty provision for this purpose, while the prayer of the truly enlightened and patriotic reformers to have the whole church property devoted to the endowment of schools and universities,—the maintenance of the fabric of the church, support of the poor, and provision of the clergy, was treated, with their other proposals regarding the policy of the church, as a "devout imagination." In an act passed in 1567, during the regency of Murray, it is set forth, that "the ministers hes been lang defrauded of their stipends, sua that they are becummin in great povertie and necessity, and notwithstanding hes continued in their vocation without payment of their stipends be ane great space, quhairthrou they are and sall be constrained to leave their vocation without remeid be provided;" and statutory authority is given for the collection of the *thirds* of the benefices, out of which to appropriate stipends for their support. No practical improvement, however, actually took place until King James had succeeded in establishing episcopacy, when, for the first time, he gave his aid in making a secure provision for the clergy. In 1617 a stipend was directed to be allocated to each minister out of the tithes of his own parish, instead of out of the general fund of "*thirds*" mentioned above, and commissioners were appointed to fix the amount, not to exceed 800 merks Scots (L. 44, 9s. Sterling), nor to be under 500 merks (L. 27 : 15 : 6⅔ Sterling). This stipend was payable by the titular or lay impropriator who drew the tithe from the

cultivator, or, where the titular had let his tithes, by the lessee, who, in consideration of the burden laid upon him, obtained a prolongation of the term of endurance of his lease.

The situation of the clergy was now completely altered from that which had subsisted before the Reformation. They were (with some exceptions) no longer incumbents in the benefices, which were permanently filled by perpetual lay titulars having the sole right to draw the tithes but under the express burden of providing for the minister serving the cure; and the ministers were thus *stipendiaries* without any right to the benefice itself, but entitled to a competent salary or stipend out of the tithes drawn by the titular. In other respects the tithe system remained as before. It was levied in the same way, and attended with the same grievances as formerly, the only difference being, that it was now drawn by *lay* titulars, who did no duty therefor, but paid a stipend to the minister who performed it, instead of being drawn by *clerical* titulars, who did no duty, but employed for that purpose a vicar, or one of the individual ministers of the establishment to which the church was appropriated. The state of matters, both as regards the grievance on the proprietors and tenantry, and the inadequately provided condition of the clergy, is thus described, and we believe truly, by King Charles I. in his first Large Declaration, published in 1639.

"We having daily heard the grievous complaint of many of our subjects of that kingdom, of all sorts, especially of the gentrie and their farmers, who paid their tithes to the nobilitie, or such others whom they in that kingdom call Lords of the Erection, or Lay Patrons,—here in England we call impropriators,—how that, in the leading or gathering of their tithes, these lords and lay patrons did use and practise the uttermost of that severitie which the law alloweth them; how they would not gather their tithes when the owners of the corne desired them, but when it pleased themselves; by which means the owners, by the unseasonableness of the weather, were many times damnified to the losse of their whole stock, or most part of it, (the law of that kingdom being in that point so strict, as no owner may carrie away their nine parts, or any part of them, until the proprietaire of the tithes have set out his tenth part);

as likewise, understanding at the same time the deplorable state of the ministers of that our kingdome in point of maintenance, how that they receive no tithes in their parishes, but some poore pittance, either by way of a stipendiarie benevolence, or else some mean allowance from these lords of erection or lay patrons, unworthie of the ministers of the Gospel, and which exposed them to all manner of contempt, and a base dependence upon their patrons."

In addition to the discontent of the landholders, tenantry, and clergy, King Charles, at his accession, evinced great jealousy of the additional wealth which had been acquired by the nobles at the expense of the crown, through the facility of his father in alienating the property of the church, and was naturally anxious to recover part of the spoils which had so exclusively gone to enrich and strengthen the nobility. Accordingly, immediately on his succession, he executed a revocation of his father's grants, and instituted a process at law for setting them aside. The determined opposition on the part of the nobles to this attempt, induced his majesty to seek for a compromise; for effecting which, he appointed commissioners to confer with the Lords of Erection, as the grantees of the benefices erected into temporal lordships were called. In order, as it is generally supposed, to gain the support of the landholders and tenantry, and thus enable him to make better terms with the nobles, he introduced into his proposals for a compromise, a plan, originally suggested by the early reformers, for commuting the tithe into a fixed payment, and enabling the landholders to redeem it from the titulars at a certain rate.

The conference issued in an arrangement, which included the establishment of our existing tithe system, and which is thus detailed in the evidence of one of the witnesses before the Irish Tithe Committee, appointed by the House of Commons during the last session of Parliament.

'After some discussion, an arrangement was entered into, whereby it was agreed that the king should abandon his proceedings for complete restitution to the crown of all the church property, and that the lay impropriators should resign, in his favour all the superiorities of the church lands, and should al-

low him an annuity out of the tithes; and further, that the tithe should be made liable to be valued, and commuted into a fixed rate, and to be purchased by the heritors or proprietors of the land, the rates to be fixed by the king himself. In order to carry this into execution, submissions (arbitrations) were executed by the principal parties interested, viz. the Lords of Erection, the Bishops, and principal Clergy, by several of the tacksmen, and by the Royal Burghs, for their respective rights of tithes, referring the matter above mentioned to the decision of his majesty. This was in 1628, and in 1629 the king issued certain decreets-arbitral, by which he determined the points referred to him. The principal matter he had to determine was the mode of valuing the tithe, and so commuting it into a fixed payment; and as to this, he declared that, when the tithe had been in use to be drawn separately, proof should be taken of the amount of it, by commissioners appointed for that and other purposes connected with the measure; that from the amount to be ascertained, there should be deducted one-fifth, 'which' the decree bears, 'We, out of our fatherly and royal care for the well of our said kingdom, ordain to be deduced off the said teinds severally valued, as said is, for the ease and comfort of our subjects;' and that the amount subject to this deduction, afterwards known by the name of the King's Ease, should be fixed as the tithe in all time to come. As it often happened, however, (as, for instance, where a person had a lease of the tithes of his own lands), that the tithes were not in use to be drawn, his majesty, to provide for that, declared that in such case, the tithe should be held to be one-fifth of the constant rent of the land, including stock and teind. The landlord's part was called the stock, and the titular's part was the teind. Then, as to the rate at which heritors or proprietors were to be allowed to purchase the right to the tithes of their own lands, his majesty determined that every heritor should be entitled to purchase from the titular or lay impropriator, the right to his own tithes at nine years' purchase of the yearly amount as valued by the commissioners; the tacksman, where the tithes were let on lease, being entitled to a proportion of the price, corresponding to the value of his unexpired lease. The tithe to be pur-

chased by the heritor was, of course, only that payable to the titular, the stipend modified out of it to the minister being excluded. In like manner, tithes payable to bishops, though they might be valued, could not be purchased by the heritor, who continued to pay to the bishop the amount at which the tithe had been valued and commuted.

"When the commissioners had ascertained the yearly value of the tithe of a particular estate, either by proof of the amount when in use to be drawn, or by taking one-fifth of the rent when not in use to be drawn, or by admission of the parties interested, a judgment was pronounced by them, fixing it as the tithe of that estate, generally estimated in grain, but sometimes in money, or partly in money and partly in grain;* and the amount so fixed by the commissioners remains to this day the tithe of such estate, neither subject to diminution on the one hand, although the whole property had been immediately turned into pasture, nor to increase on the other, although the produce and rental may have increased a hundred fold since the period of valuation†."

The king's decrees-arbitral were subsequently ratified in Parliament, and regulate all matters of tithe to the present day. The landholders have thereby been enabled to have the burden of paying the tenth of the actual produce of the land commuted into a permanent and invariable annual payment, like a feu-duty or perpetual rent, fixed either in grain or in money; and have been further empowered to purchase up this annual charge from the titular or lay impropriator, at a price calculated at nine years' purchase. When the proprietor has availed himself of the right of commutation given by the decrees-arbitral at an early period, and before the great improvement in agriculture

* The commissioners were empowered to appoint sub-commissioners in each parish, for the purpose of taking proof of and valuing the tithes; their determinations, however, requiring the authority of the High Commission to be interponed thereto. The proceedings for valuation might be instituted by the parson or by the titular when the minister was stipendiary, or by the proprietor who wished his tithes valued; or, failing all these, at the instance of an officer called procurator-fiscal, whom presbyteries were authorised to appoint for this purpose.

† Second Report of the Irish Tithe Committee; Evidence of A. Dunlop, Esq. (p. 534).

which now subsists in Scotland had commenced, this charge is a mere trifle compared with the increased rental of his property; while, on the other hand, if he have neglected to take advantage of the privilege conferred on him till the rental had greatly augmented, the tithe, of course, is fixed at a comparatively high proportion.

A proprietor in this last mentioned situation, however, has no ground of complaint, as the additional extent of the burden is owing entirely to the negligence of his predecessors; or, if he himself have purchased the property, it will have formed the ground for a diminution of the price offered by him. When the landholder did not purchase the tithe, it continued payable to the titular or his lessee; and even when he did purchase, it remained liable to be taken in a certain order to form a stipend for the minister of the parish. As formerly mentioned, the *clerical* titulars, before the Reformation, held their tithes subject to the burden of maintaining public worship at their appropriated parish churches. Then the *lay* titulars, who succeeded, obtained their gratuitous grants of the benefices and tithes, subject to the same condition; and, again, the landholder who chooses to purchase from the titular the right to the tithes of his own lands, acquires them always with the same quality attaching to them. The price at which he is entitled to purchase them, however, (nine years' purchase) is so moderate, that it is almost always his interest to do so; and it is entirely optional on his part, whether, knowing the burden, he will acquire right to them or not. The whole tithe of a parish is liable, *ultimately*, to be appropriated to the stipend of the minister; but when the total amount, as valued and commuted, has been so appropriated there can be no further charge on the land for this purpose, there being no provision for a revaluation of the tithe, which permanently remains as fixed by the decree of the commissioners. The tithe of a parish, therefore, whether payable to a titular, or retained by the landholder himself when he has acquired right thereto, remains, except in so far as already appropriated to the maintenance of the minister, a fund, out of which to increase from time to time, as circumstances warrant or require, the stipend of the minister, being in the mean while enjoyed by the titular, to whom it was gratuitously gifted under

that express burden, or by the landholder, who may have exercised his option of acquiring a conditional right to it by payment of nine years' purchase money.

This occasional increase of the stipend of the minister, out of the unexhausted fund of tithe in the hands of the titular or landholder, is under the control of the Court of Teinds, consisting of the Judges of the Court of Session, now constituted perpetual commissioners for all matters regarding tithes. The system under which this augmentation is granted, is thus explained in the evidence before referred to.

"The original commissioners fixed the stipend at a certain amount, and the clergyman is entitled, at different periods, which are now limited to every twenty years, to bring what is called a process of augmentation before the Commissioners of Teinds, to which he calls, as parties, the titular and proprietors of lands, and concludes for an increase of stipend out of the tithes remaining still unappropriated to this purpose. In this suit, the Court, judging generally from the size and rental of the parish, the amount of tithe unexhausted, the extent of the duty, the expense of living, and other circumstances, augment the stipend payable to him out of the tithes still unexhausted and in possession of the titular or of the proprietors who have bought their tithes from the titular. The stipend is then apportioned on the tithes of the parish, in a suit called a process of locality, and it is allocated in a certain order, the tithes of some lands being liable to be taken before those of others. The tithes payable to the titular are first allotted; when these are exhausted, tithes payable to the tacksman, to whom the titular may have granted leases, are next taken; then those of lands, the proprietors of which have purchased the right to them; and, finally, the tithes which belonged to the bishops during the subsistence of Episcopacy, and which are now vested in the Crown, and tithes appropriated to universities and hospitals."

The amount of the stipend thus allocated to the minister is fixed in grain. It is not, however, *payable* in grain but in money, at a rate of conversion according to the fiar prices of the county for the year. It is paid by the landholders, and the minister has no occasion to make any demand on the cultivator, except where the landholder has taken him bound in his lease to

pay the stipend, in which case it becomes part of his conventional rent; or when the landholder fails to pay, (an occurrence very rare), the minister may draw his stipend from the tenant to the extent of any rent due by him to his landlord, which is thereby so far discharged. In amount, the stipends of the Scotch clergy range from between L.150, the minimum, to about L.400 or L.500 a-year, according to the amount of the valued tithe,—the extent of the parish, and consequent proportion of duty and labour,—the expense of living, or other circumstances peculiar to the situation of the parish, which are taken into consideration by the Court in fixing the stipend. Being only a fair remuneration for the duty performed, its justice is admitted, except by those who object to any endowment whatever for the instruction of the people in religion; while it is paid from a fund destined to that purpose, in such a way as not to operate as a tax on personal capital and industry, or as a check on agricultural improvement, and the extension of cultivation. No feeling of injustice can arise in the minds of those liable in the payment of it, because they are sensible that they have no right of a kind preferable to the claim of the clergyman, but, on the contrary, have been allowed to enjoy, on most advantageous terms, a property to which originally they had no title, so long as it was not required for the public use, and under the known condition that it was liable to be taken for this purpose when required; and thus a sufficient, but in no case superfluous provision, is made for an efficient body of clergy, constantly resident in their own parishes, holding only one living, and giving a fair equivalent in duty and labour for the remuneration they receive, without taxing personal capital or industry, and without creating any feeling of hostility whatever between the pastor and his flock. Well does a system, producing such beneficial effects in its practical operation, deserve the designation of a "glorious work," justly given to it in the preamble ushering in the first of the series of statutes whereby it was ratified in Parliament (Act 1633, c. 17.) which is as follows: "For so much as our Sovereign Lord, out of his royal and fatherly care tendering the publique good of this his ancient kingdome, did immediately after his happy attaining to the crown, publish and give forth his

royal declaration anent the reforming of the abuses used in leading of teinds, wherein his Majestie's umwhile father, of eternal and blessed memorie, laboured so much in his time; and for provision and maintenance of kirks and other pious uses forth of the saidis teinds: And now his Majestie being, by God's gracious providence, present in his royal person within this His Majestie's ancient kingdome, and holding this his first Parliament of his whole estates of the same, with whom his Majestie hath advised and resolved to put that glorious work anent the teinds to a full perfection."

This "glorious work," perfected in Scotland exactly two hundred years ago, has still to be accomplished in England and Ireland. In the former country a fair commutation of the tithe, and a distribution of it more effective for promoting the religious instruction of the people, will probably ere long be carried into execution, without much difficulty, and to the ultimate satisfaction of all parties.

In Ireland unfortunately the case will be far otherwise. There the people have been, till within so very short a period, subjected to a course of unfortunate misgovernment, that they have no confidence in the good intentions of their rulers, and entertain a rooted conviction, that no redress will be given, unless compelled by the fear of insurrection or a continued system of insubordination to the laws. Besides, the evils necessarily attendant on a system of tithes not commuted into a fixed rate, whether leviable in kind, or as they chiefly are in Ireland, by composition for certain definite periods, and the injustice of providing for a body of public servants, a remuneration so far beyond the services performed by them, the great mass of the Irish people who are Roman Catholics, have this peculiar cause of irritation, that violence is done to their consciences in compelling them to pay what in part is really, and to its *full extent in appearance*, a tax on their personal industry and capital, for the support of a church maintained to teach doctrines which they deem to be heretical. They are thus in a condition most unfavourable for being satisfied with any modification of the system, however reasonable in itself, and beneficial to the country, and most liable to be made the dupes, and used as the instruments, of those who have their own selfish interests to promote.

Of these there are but too many in that unhappy land. One class of political demagogues gladly avail themselves of this subject, simply as a means of producing agitation and confusion in the hope of its subserving their ambitious designs for the attainment of power. Another class, the Roman Catholic priesthood, see in exciting the feelings of the people on this point, and preventing a fair settlement of the question, a means of aiding in the overthrow of the Protestant church, and establishing their own on its ruins *; while a large proportion of the landholders, with a cold-blooded selfishness, less excusable than the reckless ambition of the demagogue, or the party zeal of the priest, lend their aid to the same evil end, in the expectation of unjustly enriching themselves at the expense of the church and the nation. In their present state of prejudice, ignorance, and excited feeling, it is impossible to convince the people of Ireland of the truth regarding this matter. No one who has considered the subject can doubt, that provided the tithes were once commuted into a *permanent* rent charge, so as no longer to operate as a tax on the amount of capital and labour employed in cultivation, the burden of it would not in any degree fall on the cultivators; that the portion of the produce paid by them for the use of the soil, would be exactly the same, whether the whole went into the pocket of the landlord, or whether a part were appropriated in name of tithe to the maintenance of the clergy, or any other public purpose, the amount so paid by them being perfectly independent of its subsequent application, and regulated solely by the degree of competition for the possession of land in tenancy; and that the effect of the absolute abolition of tithe, would simply be to bestow it gratuitously on the landholders of Ireland, who have no more right to it than any other class of the community, and indeed have less claim to any benefit of this kind, as being perhaps, viewed as a body, the least useful, and least patriotic holders of property in the kingdom. In any

* The evidence of Dr Doyle before the Irish Tithe Committee, for the purpose of impressing on the Irish people a belief that the poor have *by law* a *right* to a portion of the tithe, affords an instance of the prostitution of talent and learning, which it is painful to witness, in one occupying so high a station in the opinion of his countrymen. It is well exposed in the subsequent able evidence of Mr Hale.

situation it would be difficult to persuade the Irish people of this by reasoning; but it is utterly hopeless, while those who know the truth, and who alone have influence with them, or are trusted by them, exert themselves to keep up the delusion for their own base ends. This state of matters renders it very difficult indeed to effect any change, which, while it remedies existing abuses, would preserve the tithe as a public fund for the promotion of religious and intellectual cultivation among the people, or for other purposes beneficial to the country; and yet it would be a circumstance deeply to be deplored if so large a fund capable of being beneficially applied for the good of the country, should be allowed to be appropriated merely to increase the revenues of absentee proprietors. Ultimately a just system of commutation and appropriation of the tithe, if effected, would command the approval of the nation; but perhaps in order to facilitate its adoption, a sort of compromise might be the most advisable course, by which, in consideration of the sacrifice of a part of the fund, the remainder might be secured for the public good. If such a measure be thought of, the proceedings in Scotland may furnish suggestions for this matter, as well as for the general plan of commutation.

Supposing that besides the commutation of the tithe into a permanent rent charge, and the limitation of the livings to an amount proportioned to the duty to be done, (reserving the rights of existing incumbents), the landholders were allowed in the mean while to retain the surplus of the tithe, so that it should become as in Scotland dormant, but not extinguished, and liable at a future period to be called up for the maintenance of churches, schools, or other national purposes, the prospect of an immediate and certain advantage might induce the landholder to promote the scheme, rather than trust to the chance, which may fail them, of obtaining a total abolition, by means of [illegible] and agitation. In this way no injury would be suffered by the public, and the great object of effecting a settlement of this question might be accomplished. This sort of speculation, however, opens a field too wide for us to enter upon, and too far removed from our present object. We shall therefore leave it for the present, and conclude with merely men-

tioning the provisions enjoyed by the Scotch clergy, over and above the stipend payable out of the tithe.

In every parish, excepting in Royal Burghs having no rural district attached, the minister, besides his stipend, has a glebe of not less than four acres of arable land, or where there is none such, an equivalent in pasture land; together with half an acre for garden, and the stance of a manse or dwelling-house and offices, which are built and kept in repair by the proprietors in the parish; and also grass for a horse and two cows, wherever there is in the parish any pasture land which formerly belonged to the church. This completes the provision sanctioned by the State, for the parochial clergy of the Established Church of Scotland, the average of which, in all, for each minister amounts to somewhat between L.200 and L.250 per annum, and we believe that no part of the public property is so beneficially expended, and obtains in return so large an equivalent of useful and valuable service.

ON A MODE OF COVERING SEED-CORN WITHOUT HARROWING.

(*To the Editor of the Quarterly Journal of Agriculture.*)

I HAVE often remarked, where wheat has been sown after potatoes, late in autumn, that the soil has become quite consolidated by a heavy fall of rain immediately after the seed has been harrowed in, and this is generally followed by a very sickly braird. In order to avoid this risk, I wish to suggest to the agriculturist a mode which I think would be advisable in all winter sown crops.

The culture of the potato, as conducted in the best managed districts, prepares the soil in the most highly pulverized manner, and in the best possible condition, for allowing the seed to germinate and extend its roots; but the lateness of raising or digging the crop, and removing it entirely from the ground, frequently prevent the sowing of wheat in autumn, or, in less disadvantageous circumstances, they certainly increase the hurry of that anxious season.

I think it may have been observed by many, that a field withstands the bad effects of the wet weather of winter more com-

pletely when it is ploughed only, than when it has also been reduced by harrowing. The plan I propose for the autumn, and also early spring sown crops, is to introduce the seed into the soil with the plough. This would secure a sufficient covering, and the sharp edge of the furrow-slice would shelter the young brairds at first, and then, by gradually mouldering down, they would act as an earthing to the plants, and when the plants were well-grown in spring, at the dry season, a single turn of the harrow would more effectually pulverise the soil than at least three times at the seed-time. It has long been the custom to plough in the seed, but then it is always done with a shallow furrow for fear of burying the seed. The mode I propose can be done while ploughing with the strongest furrow the soil admits of, and what is of great use to the after-growth of the plant, is the seed being deposited on the back of each furrow, as it is laid over with the mould-board, and which thus receives the full benefit of the loose soil of the deep furrow,—whereas, by putting in the seed with a shallow furrow, the ground is completely consolidated by the plough passing over it. Attached to the upper edge of the back part of the mould-board of each plough, I would place a small seed-box, the spout of which would deposit the seed at any required depth in the rut, formed by the coulter placed before the spout, on the back of the furrow, and the supply of seed could be regulated by a small wheel to run on the ploughed soil. The seed would then be completely covered by the next furrow, and what was in the last row of each ridge would be covered by the plough in water-furrowing. The seed would thus be sown at 8 or 9 inches distant very regularly, and the ground would never be trod on after the seed was sown, till the dry weather, in spring, at the sowing of the grass seeds, which also would have the advantage of being well covered with a single turn of the harrows.

I have sent you these few hints for insertion in this number of the Journal, which is issued in spring, for the purpose of drawing attention to the subject, early enough for experiment this season with the spring sown wheats, and shall perhaps again trouble you with a more extended communication on this subject. W. M'D.

ON THE PRESENT STATE OF THE ENGLISH PEASANTRY.

(To the Editor of the Quarterly Journal of Agriculture.)

I HAVE been so much amused with the glowing description given of the agricultural labourer's life in England, in contrast with the farm servants in this country, that I am induced to put into your possession a few facts connected with the present condition of the labourers in a parish situated in one of the counties of the south of England.

This parish contains about 4000 souls. Part of its labourers are employed in agriculture, part as woodmen, and a small number in working at a quay, discharging the cargoes of a few coasters which frequent its harbour.

The farms are all small, varying from 30 to 150 acres, and under wretched cultivation. There are no thrashing-machines in the parish. In 1830, there did exist *one*, which was destroyed by its owner, to save an agricultural mob, then scouring the country, the trouble of doing so.

The farm labourers are hired by the week, their wages averaging about 9s. during hay and corn harvests. They are allowed beer. The houses which they occupy are often at a considerable distance from their work, and the rent of them seldom under 18d. or 2s. per week. Those who have no houses to look after, and, indeed, oftentimes those who have, are paid off, whenever the weather is such as to prevent their working in the open air; and then they fly to "the parish."

From October until April, there are generally from 80 to 120 men and stout lads who can find no work. What, then, are they to do? The parish is to them the first and only resource. They apply to the overseers, as by law they are entitled to do, and *they* are puzzled how to dispose of them. A fixed wage is usually agreed upon, for what is called "parish work," viz. 6s. per week to married men with two children, and 3s. to single men. The consequence of this arrangement is, that the single man soon marries, and every child born to him is supported at the expense of the parish.

These men then, to the number mentioned, having applied

to the Overseers, are slightly examined as to their attempts to get work for themselves, and they being satisfied of the truth of their answers, turn the whole gang into a gravel pit, to pick gravel: they will there find perhaps a dozen pick-axes, with as many wheel-barrows and shovels, tools enough for six and thirty men, the remainder consequently look on, but are expected to take the tools up when the others put them down: instead of this, no one takes them up at all, unless by accident an overseer shows himself. The gravel which they pick is put into heaps for sale, but in general this work is unprofitable; the men know it to be so; and therefore, comparatively speaking, as soon as the overseer disappears, the whole are to be seen congregating, and concerting all sorts of mischief, grumbling over the hardness of their fate, the lowness of their allowance, and so on. At 3 o'clock they quit the gravel pit, cold, discontented, and with a determination to make an increased demand on the overseers, through the select vestry, on the following Friday, (the day on which that body meets). Friday arrives, the clergyman of the parish makes his appearance in the vestry room at eleven o'clock, followed by a few more members, and business soon after begins. The clergyman takes the chair, and the assistant overseer then reads the names of the aged and infirm of both sexes, who are considered fit objects for parochial relief, without being called upon to work at all. Each person as he is called on, has some complaint to make; "he is paid too little, some neighbour not so badly off as he, or she is, is paid more." Thus much time is consumed in listening to and redressing these grievances, and seldom or ever do they quit the room satisfied. This class being disposed off, the able-bodied labourers are then introduced; they come forward, sullen and discontented, declaring, as they receive the allowance, the impossibility of their existing longer on such miserable wages. A member of the select vestry asks the person before him, if he has endeavoured to procure employment elsewhere for himself? He answers "Yes." Where have you tried? "I have tried every where." Pushing him still farther, he finds he has tried nowhere, or if he has made any trifling exertion, it has been only within a convenient distance of his own dwelling. He makes a demand of a nature both exorbitant and unjust: it is refused: he repeats it in such manner as

almost amounts to a threat: at length he is dismissed; he departs with his feelings excited, and ten times more discontented than ever. This sort of skirmishing goes on during the winter months of every year. The landlords continue in a state of apathy, blind as to the best mode of promoting their own interest, guided entirely by a set of advisers, whose ideas remain stationary, and who oppose any suggestion offered to their notice, in the fear that every innovation will add to their burdens.

The maladministration of the poor-laws unquestionably has been the primary cause of all the existing difficulties, but it is quite evident to those who take the trouble of investigating into the habits and dispositions of the people who apply for parochial assistance, that were they classed as to character, and profitable or useful employment allotted to them, not only would an improvement in their general situation take place, but a restriction in the amount of poor-rates as a consequence soon follow.

In the parish here alluded to, an immense tract of crown waste land forms a part of it; 50 acres of which the present Government offered to all parishes within its range; but the conditions under which this land was to be cultivated were so binding and even impracticable, that not one parish accepted the offer.

A lease of twenty-one years, at a pepper-corn rent, renewable at the expiration of that term, was offered on the following conditions: three-fourths of the 50 acres to be allotted to deserving labourers, who were to *fence it against deer*, and manure the ground, before taking from it a crop of potatoes; the remaining fourth part of this land was to be left for the overseers to cultivate under the same restrictions. After due consideration the land was not procured, for reasons which will appear satisfactory, even to those who intended to confer the boon: the labourers could neither afford to fence it or manure it, and as the land was to be let only if labourers could be found to take it, the overseers could not benefit in any way by the offer.

It would, however, be attended by a far more favourable result, were government to remove these restrictions, and freely give the whole 50 acres to the overseers, churchwardens and select vestry to be disposed of, and cultivated as they may consider most advantageous for the general good; the land would soon be fenced and made to produce abundantly, by means of

the labour of which they are at present so wasteful: it would teach those confirmed idlers and paupers the use of their hands, now in a fair way of becoming useless members for want of practice; and we should have the satisfaction of seeing land now yielding nothing, raising food sufficient to maintain (for half the year at least) all those who worked upon it; the men themselves would go on with some heart, because they would soon feel that their labour was turned to some account, instead of themselves remaining in a state of melancholy dependence.

Nothing can be worse than the whole system of management as at present in operation regarding the poor; it is demoralizing them to a fearful extent, pilfering increases, incendiarism,—a novel expedient,—has started into existence, to make us inquire into the condition of the agricultural labourer, and if some remedy is not immediately applied, we shall find, to our cost, that delay has been dangerous.

So long as the present law exists regarding the management of the poor in England, and overseers are bound to find work for those who say they can procure none elsewhere, the Government ought to remove that part of the act of Parliament which confines parish-overseers and churchwardens from hiring a greater quantity of land than twenty acres for the use of paupers; there can be no valid reason offered for preventing them having a sufficient supply for the whole number which may be brought upon them, and thereby give some return for the immense capital annually thrown away in poor-rates. The lavish way of expending these funds just now, is extremely disheartening to those who pay the rates, and, what is of far more consequence, to the future welfare of the country, and it is destructive to the moral habits of those who receive them. A.

NOTICE ON THE HIGHLAND SOCIETY OF SCOTLAND.

The Highland Society of Scotland having attained its fiftieth year, and celebrated the jubilee of its existence with appropriate splendour, we intended to have given a short sketch of its history, and of the various subjects of national importance which it has fostered and promoted since it was founded in 1783; but the

necessary inspection of its voluminous records, in order to give a correct narrative of its extensive usefulness, has prevented their insertion in the present number. Such an account, we presume, will be particularly acceptable to our English and Irish readers, who, we have reason to believe, entertain very erroneous notions in regard to the objects of the Highland Society of Scotland. They will perceive, however by the account which we shall give, that its liberality not only embraces every object, and encourages every improvement of national importance in connexion with Agriculture, but that, in the management of its extensive funds, that liberality is tempered with becoming economy. In both points of view, the Society is an object to be admired and imitated.

NOTICE ON GRUBBERS OR CULTIVATORS.

THE "Southern Farmers" will find their wishes have been anticipated in the second volume, page 840, of the Quarterly Journal of Agriculture, where they will find a very satisfactory account of the principles and mode of action of this class of implements. We do not know that they are to be found for sale in London, but they can be easily procured in Edinburgh, and the freight cannot be much by sea to London.

We hope the "Southern Farmers" will not be led away with the apparently exaggerated statement of the economy in the use of these implements with which the writer of the extract from the Gardeners' Magazine which they sent us had been furnished. We think they will be wofully disappointed if they lay aside the good old plough for this modern invention. Grubbers may, we believe, be used with some advantage on light smooth soils, but the range of their application is obviously limited. We shall, however, request our correspondents who are better acquainted with grubbers than we are, to give their opinion, derived from practice, of their comparative utility and economy.

The numerous, and most of them urgent, papers in this Number, have encroached upon the space usually allotted to Miscellaneous Notices. They shall appear "unshorn of their just proportions" in the next Number. The Agricultural Report has, for the same reason, been postponed.

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at th following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 2.	54 1	28 1	19 2	34 6	38 6	34 8
9.	54 4	28 8	19 3	33 6	37 0	34 11
16.	54 6	29 10	19 5	34 0	39 0	34 11
23.	56 0	30 4	19 8	34 2	38 0	35 7
30.	56 1	32 0	19 8	36 0	40 0	34 8
Dec. 7.	57 6	32 3	19 9	35 6	39 4	35 7
14.	60 3	31 5	20 2	34 8	38 2	35 11
21.	58 0	29 9	20 1	33 10	38 8	35 4
28.	57 0	29 11	19 5	34 6	40 0	35 1
1833.						
Jan. 4.	56 2	27 9	19 1	33 0	40 6	34 7
11.	56 1	28 5	18 4	32 8	39 6	33 11
18.	55 3	27 2	18 8	33 0	40 6	32 10
25.	56 4	27 8	18 7	34 0	39 0	32 6

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Ba 9 St.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 2.	23 10	13 4	12 2	9 6	19 1
9.	25 6	14 0	13 1	10 0	20 6
16.	27 6	15 4	14 0	10 6	18 6
23.	27 8	15 0	13 6	9 6	17 10
30.	29 6	15 0	13 0	10 0	18 0
Dec. 7.	29 0	15 0	12 6	9 6	17 6
14.	28 6	15 0	12 6	9 3	17 6
21.	29 0	15 6	12 6	9 0	17 2
28.	27 0	15 0	12 0	8 9	17 4
1833.					
Jan. 4.	27 6	15 0	12 6	8 9	16 6
11.	28 6	15 6	13 0	9 0	17 2
18.	28 6	14 6	12 0	9 3	17 6
25.	28 0	14 6	12 0	8 6	17 2

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 6.	50 1	31 10	16 8	33 8	38 8	37 6
13.	48 3	32 2	18 0	34 0	39 0	36 8
20.	49 10	36 4	17 10	33 2	38 6	38 2
27.	49 0	31 11	17 10	33 0	37 6	37 8
Dec. 4.	49 1	31 10	17 3	35 0	38 8	37 2
11.	49 8	30 2	17 4	35 2	38 2	34 0
18.	50 0	32 4	17 6	34 0	37 8	34 6
25.	50 6	32 9	17 10	33 6	37 6	33 10
1833.						
Jan. 1.	52 7	31 10	18 10	34 0	38 8	36 3
8.	49 4	31 0	17 5	32 0	39 6	35 0
15.	49 5	30 1	17 9	31 4	38 6	35 8
22.	50 9	27 10	17 4	32 1	39 2	36 6
29.	50 5	28 4	17 8	33 0	38 10	36 0

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.	Beans
1832.	s. d.	s. d.	s. d.	s. d.	s. d
Nov. 7.	53 2	28 11	19 10	30 10	30 6
14.	51 6½	28 6	19 6½	30 6	30 0
21.	53 3	29 6	19 8	30 0	28 4
28.	53 2	30 1	20 0	30 6	28 10
Dec. 5.	53 2	30 2	19 7	30 0	28 6
12.	53 0	28 2	19 9	29 8	28 7
19.	54 2	29 10	19 8	29 2	27 8
26.	51 8	28 3	19 2	29 0	26 11
1833.					
Jan. 2.	51 4	27 10	18 2	28 6	27 2
9.	51 2	27 4	17 7	28 0	25 6
16.	52 2	27 10	18 0	28 6	27 2
23.	51 5	27 3	18 8	28 0	27 7
30.	51 10	28 6	19 6	28 6	28 4

TABLE showing the Weekly Average Prices of GRAIN, made up in terms of 7th and 1 Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIG CORN; the Duties payable thereon, from 1st November 1832 to 1st February 1833.

ate.	Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	
832.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s
ov. 2.	53 3	53 5	33 8	30 2	30 10	16 10	18 6	18 9	19 9	34 1	33 5	19 9	38 6	39 3	11 0	34 8	35 8	1
9.	52 7	52 9	34 8	30 4	30 3	16 10	18 10	18 9	19 9	32 5	33 3	19 9	36 10	38 9	12 6	34 8	35 4	1
16.	52 6	52 5	34 8	30 2	29 11	18 4	18 8	18 8	19 9	32 8	33 0	19 9	38 5	38 5	12 6	34 3	34 10	1
23.	53 3	52 7	34 8	31 2	30 1	16 10	18 11	18 8	19 9	32 5	32 11	21 3	37 8	38 2	12 6	34 10	34 9	1
30.	53 11	53 0	33 8	31 5	30 5	16 10	19 0	18 9	19 9	34 6	33 2	19 9	39 10	39 3	12 6	34 5	34 8	1
ec. 7.	54 7	53 4	33 8	31 7	30 10	16 10	18 10	18 10	19 9	32 8	33 2	19 9	38 8	39 4	12 6	34 5	34 7	1
14.	54 9	53 7	33 8	30 10	30 11	16 10	18 8	18 10	19 9	34 4	33 2	19 9	40 2	39 7	12 6	34 2	34 6	1
21.	54 5	53 11	33 8	30 3	30 11	16 10	18 11	18 10	19 9	34 2	33 6	19 9	39 6	39 0	11 0	33 5	34 3	1
28.	53 2	54 0	32 8	28 9	30 8	16 10	18 1	18 9	19 9	31 7	33 8	19 9	38 7	39 1	11 0	33 8	34 1	1
833.																		
an. 4.	52 6	53 11	33 8	28 3	30 2	16 10	18 2	18 7	19 9	31 5	33 1	19 9	39 6	39 4	11 0	32 5	33 8	1
11.	52 7	53 8	33 8	27 10	29 7	18 4	17 4	18 4	19 9	31 8	32 7	21 3	38 5	39 2	11 0	31 10	33 8	1
18.	52 8	53 4	33 8	27 7	28 11	19 10	17 4	18 1	19 9	32 8	32 7	21 3	40 3	39 5	11 0	31 7	32 9	2
25.	53 4	53 1	33 8	27 6	28 4	19 10	17 1	17 10	21 3	33 7	32 6	21 3	37 9	39 0	11 0	31 1	32 3	2

MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof: from 1st October 1832, to 1st January 1833.

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs.
1.	17,241 6	6,087 2	23,329 0	111 4	12,233 4	12,345 0	526,998 0	41,027 4	568,025
	1,461 4	..	1,461 4	5,145 3	..	5,145 3	18,678 7	..	18,678
	1,987 7	..	1,987 7	53 2	..	53 2	274,747 0	..	274,747
	2 0	..	2 0	2 0	..	2 0	4,178 6	..	4,178
	616 6	..	616 6	561 2	..	561 2	3,628 3	..	3,628
	2,062 0	..	2,062 0	1,776 4	..	1,776 4	25,290 2	..	25,290
als, .	23,371 7	6,087 2	29,459 1	7,649 7	12,233 4	19,883 3	853,521 2	41,027 4	894,548
1.									
	7,920 7	6,927 6	14,848 5	131 1	13,446 7	13,578 0	526,781 7	35,284 2	562,066
	2,657 1	..	2,657 1	1 5	..	1 5	18,000 2	..	18,000
	4,266 1	..	4,266 1	30 5	..	30 5	260,405 2	..	260,405
	6 5	..	6 5	8 2	..	8 2	4,054 4	..	4,054
	2,161 1	..	2,161 1	2,722 2	..	2,722 2	3,160 5	..	3,160
	21 0	..	21 0	2,920 6	..	2,920 6	21,562 7	..	21,562
als, .	17,032 7	6,927 6	23,960 5	5,814 5	13,446 7	19,261 4	833,985 3	35,284 2	869,269
1833.									
	2,717 5	3,749 4	6,467 1	91 5	11,758 1	11,849 6	517,764 3	26,182 5	543,947
	90 7	..	90 7	1 0	..	1 0	17,504 1	..	17,504
	125 1	..	125 1	42 2	..	42 2	222,932 1	..	222,932
	..	..	..	..	..	..	4,054 4	..	4,054
	304 5	7 4	312 1	392 5	7 4	400 1	3,087 4	..	3,087
	12 7	..	12 7	..	..	..	20,962 4	..	20,962
als, .	3,251 1	3,757 0	7,008 1	527 4	11,765 5	12,293 1	796,305 1	26,182 5	812,487

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	wt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr.
. 1.	560 1 6	3,633 0 21	4,193 1 27	27 2 15	5,970 2 13	5,998 1 0	563,410 2 27	20,710 0 19	584,120 3
al, .	31 3 8	..	31 3 8	9 3 14	..	9 3 14	3 0 9	82 2 11	82 2
tals, .	592 0 14	3,633 0 21	4,225 1 7	37 2 1	5,970 2 13	6,008 0 14	563,413 3 8	20,792 2 23	584,206 2
. 1.	856 3 7	7,533 0 15	8,389 3 22	15 0 20	8,791 0 19	8,806 1 11	549,520 1 5	15,921 1 21	565,441 2
al, .	..	..	..	..	..	..	..	82 2 11	82 2
als, .	856 3 7	7,533 0 15	8,389 3 22	15 0 20	8,791 0 19	8,806 1 11	514,520 1 5	16,004 0 4	565,524 1
1833.									
	4,323 2 14	2,034 3 14	6,358 2 0	30 1 19	4,317 3 16	4,348 1 7	546,384 2 23	13,643 0 1	560,027 3
al, .	..	..	..	7 0 0	..	7 0 0	..	82 2 11	82 2
als, .	4,323 2 14	2,034 3 14	6,358 2 0	37 1 19	4,317 3 16	4,355 1 7	546,384 3 23	13,725 2 12	560,110 2

PRICES of BUTCHER-MEAT.

Date.	Smithfield, *Per Stone of* 14 lb.		Morpeth, *Per Stone of* 14 lb.		Edinburgh, *Per Stone of* 14 lb.		Glasgow, *Per Stone of* 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
Nov.	6/ @ 7/6	6/6 @ 8/	5/6 @ 6/9	6/6 @ 7/6	6/6 @ 7/6	6/6 @ 7/6	6/9 @ 7/9	6/6 @ 7/9
Dec.	6/ 7/	6/ 7/6	5/6 6/6	5/9 6/9	5/6 6/6	5/6 6/6	6/3 7/	6/ 7/3
1833.								
Jan.	6/6 7/6	6/3 7/9	5/6 6/9	5/6 7/	5/6 6/6	5/3 6/9	6/6 7/6	6/3 7/6

PRICES of English and Scotch WOOL.

English, per 16 lb.—*Merino*, Washed, 21/9 @ 26/6; in Grease, 15/ @ 19/.—*South Down*, 15/ @ 22/; *Leicester*, 16/6 @ 20/; Ewe and Hog, 15/ @ 17/6.—Ewes, 14/ @ 15/.—*Lacks*, 10/ @ 11/; *Moor*, Ewe and Hog, 7/ @ 7/6.

Scotch, per 24 lb.—*Leicester*, 27/ @ 29/; Ewe and Hog, 23/ @ 25/6.—Ewe, 21/ @ 24/.—*Cheviot*, White, 23/ @ 25/; Washed, 17/ @ 19/; Laid, 14/6 @ 15/6.—*Moor*, White, 10/ @ 11/; Laid, 8/ @ 9/6.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of January 1832, *and 5th of January* 1833, *showing the Increase and Decrease on each head thereof.*

	Quarters ended January 5.		Increase.	Decrease.	Years ended January 5.		Increase.	Decrease.
	1832.	1833.			1832.	1833.		
	£	£	£	£	£	£	£	£
Customs, . .	3,528,453	3,887,306	358,853	..	15,336,715	15,559,882	223,167	..
Excise, ...	4,265,574	3,966,488	..	299,086	..	14,657,221	396,346	..
Stamps, . . .	1,618,770	1,575,955	..	42,815	6,547,475	6,515,344	..	32,131
Post-Office,	328,000	338,000	10,000	..	1,391,006	1,393,000	..	68,006
Taxes, ...	1,981,262	1,902,823	..	78,439	4,864,342	4,943,885	79,543	..
Miscellaneous,	21,207	34,729	13,522	..	81,598	59,853	..	21,745
			382,375	420,340			699,056	121,882
	Deduct Increase, . .		..	382,375	Deduct Decrease, .		121,882	
	Decrease on the quarter,		..	37,965	Increase on the year,		577,174	

FOREIGN CORN MARKETS.

The natural depression incident to the season included in the last quarter in transactions in foreign grain, has been felt in an extraordinary degree this winter. Capitalists are doing nothing in foreign corn, and even little of it has been released from bond for home consumption. The warlike operations in Holland made a little stir for a time in the Baltic and our own ports; but since these operations are no longer of an active nature, the foreign market has also assumed its inactivity. Under these circumstances, we can only give the nominal prices at some of the best shipping ports. At Hamburgh, wheat weighing 59 lb. and 60 lb. per bushel, can be shipped free on board at 26/ to 28/ per quarter; barley, from 50 lb. to 52 lb. per bushel, at from 12/6 to 13/6 per quarter; heavy oats, at from 10/ to 10/6 per quarter. At Dantzig, high mixed wheat are from 30/ to 36/, other descriptions, from 23/ to 30/; barley, 17/ to 18/; oats, from 11/ to 12/ per quarter. At Rostock, wheat, from 25/ to 26/; barley, 13/6 to 14/6; oats, 10/6 to 12/ per quarter. And at Wismar, wheat is from 25/ to 27/; barley, from 14/ to 15/; and oats from 10/ to 11/6 per quarter. At these prices, it is supposed, some of the capitalists of this country will be induced to buy in the spring; but the agents for Polish property are indisposed to sell.

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ON THE STIPENDS, MANSES, AND GLEBES, OF THE CLERGY OF SCOTLAND.

HAVING in our last number given an account of the system established in Scotland two centuries ago for commuting the tithe, and enabling proprietors to acquire right to that of their own lands, under the burden previously inherent in it, of providing out of it a maintenance to the clergy, we now proceed to point out the effects of the system in its practical operation.

It will be remembered, that, consequent on the Reformation, the whole tithe of Scotland was granted by the Crown to lay impropriators, subject to a provision in favour of the ministers of parishes, which provision might be increased out of the tithe so impropriated from time to time, as a change of circumstances rendered necessary or proper. These lay impropriators or titulars levied the tithe in kind from the cultivator, and they appear to have done so with much severity, as is truly asserted by King Charles I., who, in his Large Declaration, published in 1639, sets forth his having "daily heard the grievous complaints of many of our subjects of that kingdom, of all sorts, especially of the gentry and their farmers, who pa d their tithes to the nobility, or such others, whom we, in that kingdom call Lords of the Erection, or Lay Patrons, here in

England we call Lay Impropriators, how that in the leading and gathering of their tithes, these Lords and Lay Patrons did use and practise the uttermost of that severity which the law alloweth them, how that they would not gather their tithes when the owners of the corn desired them, but when it pleased themselves, by which means the owners, by the unseasonableness of the weather, were many times damnified by the loss of their whole stock, or most part of it, the law of that kingdom being in that point so strict as no owner may carry away his nine parts, or any part of them, until the proprietor of the tithes have set out his tenth part." The first practical result of the new system was to extinguish the levying of tithe in kind, with all its attendant grievances and oppression. The amount of tithe exigible at the period of valuation is fixed as the tithe of the land, and it so remains, without reference to the produce of the soil, a fixed unalterable quantity, like the land-tax, feu-duty, or rent payable under a lease renewable for ever. The consequence of this is not merely to remove a fertile source of most grievous oppression, dispute, and ruinous litigation, but also to withdraw a formidable barrier, which, in England and Ireland, still obstructs the cultivation of waste land, and the improvement of that already under culture. Even under a composition, though the grievance of levying in kind is done away, the obstacle to permanent improvement is still great, because at the end of the period for which the composition has been agreed upon, and when a new composition comes to be fixed, it is then liable to be increased with reference to the augmented production of the land, and so to withdraw from the improver a portion of the profits of his own capital invested therein; while, under a fixed valuation, as in Scotland, the proprietor may improve to any extent, in the perfect confidence that the whole returns from the outlay of his capital will be drawn by himself exclusively. The practical effect of this in accelerating the agricultural improvement in Scotland, has undoubtedly been great, and highly advantageous to that part of the empire.

The next practical advantage derived from this system was, that owners of land, who paid their tithe to lay impropriators, besides being entitled to have it fixed at a certain unalterable amount of yearly payment, were farther enabled to re-

deem the burden at nine years' purchase, always under the obligation of course of the tithe so bought by them from the lay impropriator, being liable to be called up for augmenting the stipend of the minister when that became necessary. In the mean while, however, they relieved themselves of an annual payment at a very easy rate, and have in consequence had the advantage of a very favourable arrangement, in some instances for a very long period of time.

The third practical result is one of great importance in a religious and moral, as well as in an economical, point of view, and it offers a very striking contrast to the state of matters in England and Ireland. In these countries the clergy have to levy their tithes, whether in kind or by composition, from the farmers and other actual cultivators of the soil; and apart altogether from the grievance attendant on drawing tithe in kind, this practice is attended with many evil consequences. It is a very great burden on the clergyman himself to be obliged to seek his income from so many different parties. This is attended with greatly more expense to him than when it is received from only a few hands, both in the mere matter of collecting, and the loss likely to be sustained by inability to pay, and it occupies a great deal of his time, which might be employed otherwise with great advantage to his parish. But farther, it brings him most injudiciously into very unpleasant contact with the great body of his flock, including many who feel the payment an actual hardship, and cannot but entertain towards the party who is placed under the necessity of compelling them to make it, feelings very prejudicial to his usefulness as a minister. Heart-burnings, disputes, law-suits, and dissent from the church are among the natural consequences of this system, and nothing can be more injudicious and impolitic than to place the clergy of an established church in so invidious a position as they are thus obliged to occupy. Not only is their usefulness as ministers greatly impaired, and the grand object of a national church in advancing religion and morality among the people obstructed, but a strong feeling of hostility to the church itself is generated, which has a powerful tendency towards its ultimate overthrow.

In Scotland the situation of the minister is far different. His stipend, as the provision to him out of the tithe is called, is payable by the *proprietor of the land* alone. Even when the proprietor has taken his tenant bound to pay the tithe as a part of his conventional rent, the minister is not required to proceed against the tenant if he neglect to pay, but may without recognising him in the least make his demand against the proprietor; while, again, if a proprietor neglect to pay, although the clergyman is entitled to recover the amount from the tenant, even though not bound for the tithe in his lease, so far as he may have rent in his hands due to the landlord, he cannot be compelled to pay one farthing beyond that amount of rent so due by him, and for which he is entitled to take credit in settling with the landlord. In general, however, the stipend is paid regularly by the proprietors, who of course are comparatively few in number. In some parishes there is only one, in others only three or four, and in scarcely any more than forty or fifty, the average being probably between ten and twenty. In this way the collection of the stipend is comparatively simple. It occupies no time—it is attended with no expense—there is no risk of loss by non-payment, and, above all, there is no unpleasant collision between the pastor and his flock; no disputes, heart-burnings and quarrels about matters temporal, and NO LITIGATION,—a process for recovery of stipend being in practice at the present day ABSOLUTELY UNKNOWN IN THE COURTS OF LAW IN SCOTLAND. What a contrast does this present to the state of matters in England and Ireland, to which might well be applied an observation of the Duc de la Rochefoucald in the Assembly of Notables in France on the eve of the Revolution, thus related in Dumont's "Souvenirs sur Mirabeau." "*La dîme*, disait l'archevêque d'Aix d'un ton pleureux, *cette offrande volontaire de la piété des fidèles. La dîme*, reprit le Duc de la Rochefoucauld avec un ton simple et modeste, qui rendait le trait plus piquant, *la dîme cette offrande volontaire de la piété des fidèles sur laquelle existe maintenant quarante mille procès dans le royaume.*"

The machinery by which the state of matters existing in Scotland is brought about is extremely simple. When the amount of the stipend payable to the minister is fixed by the Commissioners of Teinds as mentioned in the last number, it is allocated

on all the proprietors in the parish, a proportion being laid on each corresponding to the total amount of the tithe of the property, and a decree is thereupon pronounced by the Court, in terms of the scheme of allocation, when finally settled. When any disputes arise between the proprietors as to the proportions to be laid on them as among each other, an interim scheme is sanctioned by the Court, whereby the minister obtains payment in the mean time, leaving the proprietors to equalize among themselves their respective over and under payments during its subsistence, when the final decree is pronounced on the points of dispute being determined.

This decree, and the interim decree while it lasts, is equivalent to a judgment against each of the several proprietors, for his particular portion of the stipend in all time coming, every year as it falls due; and if a proprietor were to fail to make payment, instead of being obliged to raise a new suit, the minister might at once proceed to execution against him, under the general decree of locality, as it is termed; but in practice this is never necessary, the stipend being almost universally paid without compulsitor of law.

The amount of the stipend must, under certain exceptions, be fixed in grain or victual, and generally one-half is decreed in oatmeal, and the other half in barley. But though the *amount* is thus *fixed* in grain or meal, it cannot now be made payable in this shape by the proprietor to the minister. It must be paid in money, according to a conversion, at the rate of the average or fiar prices struck in each county by the Sheriff for the crop in respect of which it is payable.

This proceeding, though perfectly familiar to our northern readers, is not so generally known beyond the bounds of Scotland. The Sheriff of each county, in the month of February, generally as soon after Candlemas as possible, summons and impannels a jury of fifteen persons, in whose presence a sufficient number of witnesses, farmers and corn factors, are examined as to the prices at which the several sorts of grain, of the growth of the county, of the preceding crop, have been selling since it was reaped. On the evidence so laid before them, the jury strike an average for each description of grain, which, the authority of the Sheriff being interposed thereto, constitutes what

are termed the "fiars prices*," and according to these rates the amount of grain forming the stipend of the minister is converted, and paid to him in money.

There is thus secured to the clergy the greater general permanency in value of a grain stipend, with all the convenience and comfort of a money-payment, and without having imposed on them the inconsistent duty of trafficking in the disposal of the *ipsa corpora* of the grain in which the amount of their stipend is fixed. In every particular, the convenience and usefulness of the minister is attended to, and at the same time combined with the greatest possible ease to the proprietor in the payment; so that, while no cause of collision can possibly exist between the minister and the great body of his flock, it is not found in practice that the stipend creates any coldness or dispute between him and the proprietors who actually pay it, the rights of each being so clearly defined, the burden being confessedly so just, and imposed and collected so favourably for the interests and convenience of all concerned.

The strongest encomium that can be passed on the practical working of the system, is the fact already noticed, that a process for payment of stipend, by a minister of a country parish, is almost unknown in the courts of law of Scotland, and that among the members of the association lately formed in opposition to the Established Church, there is not probably one who is liable in payment of tithe.

Having thus described the mode by which the stipends of the clergy in Scotland are paid, we shall conclude by a short statement of the mode in which their manses (as the parsonage-houses are called) are maintained. The burden of building a manse, keeping it in repair, and rebuilding it when it becomes dilapidated, lies upon the proprietors in the parish. It was originally imposed on the parishioners generally, but never seems to have been actually borne by them, and now it is undoubtedly limited to the proprietors. A regular meeting of these proprietors or heritors is entitled, by a resolution, to assess the body of proprietors for the sums considered by them necessary for repairing or rebuilding the manse, and they may con-

* Our English and Irish readers will find Tables of the fiars prices of crop 1832, in this number of the Journal.

tract for, and superintend the execution themselves, their judgment imposing an assessment being always subject to review by the Court of Session, as the supreme civil tribunal, at the instance of any proprietor who is dissatisfied. If the heritors refuse to assess themselves voluntarily, or not to the extent considered requisite, the minister is entitled to apply to the Presbytery, who may ordain them to rebuild the manse, or make the necessary repairs on it, as they shall determine; and on the failure of the proprietors, the Presbytery may take in estimates, make contracts, impose an assessment on the proprietors, and appoint a collector to levy it, at whose instance execution may proceed, in virtue of the decree of the Presbytery, which, however, is always subject to review by the Court of Session, on the complaint of any of the heritors who may think it unwarranted or extravagant.

The sum allowed by the Court for a new manse is generally L.1000, and for repairs, whatever may be required to render it properly habitable and comfortable. At building or repairing a manse, the heritors may require the Presbytery to inspect it, and to pronounce a judgment, "declaring it free," as it is technically called, which is a formal acknowledgment of its sufficiency, relieving the heritors from future repairs during the incumbency of the existing minister, who is thereafter obliged to keep it in repair out of his stipend. This obligation, however, does not extend to those extraordinary repairs rendered necessary by decay in the course of time, which must still be borne by the heritors as if the manse had not been declared free. Besides the dwelling-house there must be suitable offices attached thereto, with half an acre of ground for garden, (including the site of the house), in addition to the four acres Scotch measure of arable glebe, which every clergyman of a country parish is by law entitled to.

The minister thus provided for must constantly reside within his parish; absence, except on leave from the Presbytery in very special cases of ill health, and very rarely granted, being, according to the ecclesiastical law, which is enforced by the church courts, a sufficient cause of deposition, while, according to the municipal law, non-residence is also a cause of deprivation of the benefice; and the penalty is declared to be incurred by ab-

sence from the parish for four Sundays in the whole year, without lawful cause allowed by the church judicature. Non-residence, therefore, is of course, absolutely unknown, and absence for any period beyond occasionally one or two weeks in the year exceedingly rare. Farther, plurality of benefices is utterly prohibited, and cannot possibly exist, and no minister of a parish can exercise any civil office, as of the magistracy, or other public trust, whereby his time and attention may be diverted from the duties of his holy calling, although, contrary to the principle of this exclusion, many civil duties have been, of late years, imposed on ministers by special acts of Parliament, as granting certificates to pensioners and the like. On the whole, however, the clergy of Scotland are as exclusively devoted to the duties of their pastoral office as those of any existing established church. The greatest extent of efficient service is obtained at the least possible expense to the country; and the funds for that expense are levied in a way the most satisfactory that can be devised. This last matter is in course of being adopted in England and Ireland, and we trust soon also to see the introduction of those other regulations we have adverted to as to non-residence and pluralities, as being essential to render the church efficient in promoting its grand object, the religious and moral cultivation of the people. This is now coming to be acknowledged as the true object of an established church, instead of its being considered, as has hitherto been too generally held, a means of providing a livelihood to one class of people, and patronage to another. This principle, however, being recognised, we may hope at last to see the *established* church become also the *national* church; and, if so, her permanent existence will be secured, notwithstanding all the efforts of her enemies which nothing but her own abuses render a subject of

ON TRAINING STANDARD FRUIT-TREES. *By Mr* GORRIE, *Annat Garden.*

To the readers of an agricultural journal, a few remarks on the mode of training fruit-trees as standards, either in the orchard or garden, may not be altogether uninteresting, inasmuch as orchard fruit forms one of the luxuries of which the farmer and his labourer may and do partake, in common with the prince and the peer. In future communications, I may direct attention to the most esteemed varieties of pears and apples, and give such descriptions of their form and quality as may make them be easily known. In the mean time, I shall attempt to describe a mode of training standard fruit-trees, which appears to me decidedly superior to the ordinary practice of what is termed "*Bell-shaped*" training.

A young tree, whether standard or dwarf, set off in the ordinary "bell-shaped" method, is a sightly object for a few years, either in the orchard or kitchen-garden border; and much has been written in recommendation of the practice, setting forth the advantages of the admission of the sun's rays, the breadth of surface exposed to genial showers, refreshing dews, and so forth; and, for a few years, the young tree is certainly of easy management, and proceeds smoothly; but by-and-by the roots extend, the absorbent spongioles increase in number, and become more efficient in promoting luxuriance of shoot,—a tendency encouraged by the annual pruning requisite to maintain the shape of the "bell;" and Nature, always true to her own laws, attempts to rectify the errors of man, by throwing up perpendicular shoots from the centre of the tree. In the garden these aspiring shoots are kept within regular bounds by the pruning-knife, and the favourite form is for a few years maintained. In the orchard, however, the contention between art and nature is neither so severe nor so long protracted. The hollow cavity of the "*bell*" soon fills up with contending spray, which overhang their older and inferior neighbours; the bell is transformed into the shape of a mop, and the natural and principal current of sap is wasted in supporting useless branches, where the "bell" system says they should never have been.

When the tree has arrived at this stage of natural disorder, the advice of the gardener is called in. He is told, of what a single glance at the irregular mass of spray might have informed him, that all the fruit on the under branches are deficient in size and colour, and moreover insipid in taste; that a slight wind displaces the fruit from the limber-spray, ere it is nearly matured; that there is only a sprinkling of fruit over the extremities of the shoots; and that neither flower nor fruit have been observed for many a year near the centre of the irregular mass. The case then becomes desperate, and as desperate a cure is prescribed. The low branches and cross branches, of which there is ample store, are sentenced to immediate excision. The subdued under tier of branches are lopped off, cross branches are displaced; and, as a natural consequence, water-shoots break forth in abundance at every wound; a fresh supply of spray ascends from the centre; the side branches are again overtopped; the fruit becomes easily shaken, scanty, and insipid; the branches that once overtopped their fellows, are soon overshadowed by shoots, which, in their turn, must also bend beneath the shade of their more youthful aspiring superiors.

In the orchard this unnatural warfare seldom continues long. After a few successive mutilations, the trees are allowed to take any shape, to which, from such a mass of spray, they may by their nature be directed. Some varieties of apples and pears struggle hard to overcome the inveterate obstinacy of man; and, after suffering much maltreatment, form fine fruit-bearing tops. Of this the Gold knap and yellow Benvie pear, and the Gogar and Glammis pippin apples, afford striking examples. Wherever they are met with in old orchards, the full crops which such towering trees uniformly bear when they have attained the conical or pyramidal shape, would seem to point out a process of training deserving of imitation.

Respect for the opinions of eminent writers on horticulture, [illegible] of training standard fruit-trees, [illegible] by existing general practice, induced me, like many [illegible] to adopt the fashionable "bell" mode; but, on observing that those trees in old orchards, most celebrated for bearing heavy crops, uniformly approximated to the pyramidal form; observing also, that the lower branches of such trees were as pro-

lific, healthy, vigorous, with the fruit as well swelled, and as highly coloured, as to stand a comparison with the more elevated parts of the tree, it was easy to infer that, by giving fruit-trees similar forms, similar results might reasonably be expected.

Erroneous training, long practised, is not easily corrected either in man or tree. I had some fruit-trees under my management, which, for nearly twenty years, I had been at no small trouble to divert from a natural and upright course; but, after observing the above results, about five years ago, I adopted a more *natural* mode of training. Some of my old trees I judged to be incorrigible, and these I allow to stand as specimens of the wisdom of the ancients. I soon succeeded in bringing others which had for fifteen years maintained the form of a hooped petticoat reversed, to form tolerably handsome pyramids. All under that age were easily converted, and I have now many specimens of pyramidal training to demonstrate the advantage of the practice. It has been said and written by men to whose opinions on many things I feel disposed to pay much deference, that "every tree has its own natural form, from which no art of pruning will long divert it." This apophthegm, with all due submission, I take leave to deny. I know of no pear, apple, plum, or cherry tree, not even the slender-twigged Morello, that may not be easily made to assume and maintain a pyramidal form. I may here remark, that too much nicety in training the centre or leading shoot is ruinous to the system. Let that shoot incline to the right or left, or deviate to every point of the compass, only let it always be the highest part of the tree; let the lowest branches be always the longest, with their points farthest extended from the main stem. They will thus attract their due proportion of nourishment. Let no superior branch extend quite so far as the one immediately under it. This is easily effected by pruning off a luxuriant leader, and leaving a weak lateral annual shoot to supply its place. Robbery and overshadowing will then soon cease, or be easily corrected. Preserve an easy and regular outline, without approaching to stiffness; keep the branches sufficiently open, and they will be covered with fruit-bearing spurs inward to the main stem. No *violent* pruning will ever be required; the flow of sap will be regularly distributed; the tree will become lofty, and stand as

firmly as its Egyptian prototypes, and the fruit will hang undisturbed by the winds till it drop off fully ripe.

It must appear obvious to the most superficial observer, that a tree ascending to a considerable height above what it could possibly reach under the old mode of pruning, and occupying the same diameter with its lower side branches, may easily bear proportionally a heavier load of fruit than a tree whose top has been tortured into the form of an empty bowl.

ON IRISH AGRICULTURE.

This is a subject, which, in detail, would exhibit a great anomaly of principles and practice, resulting from the various conflicting circumstances, favourable and untoward, to which this country has been always subject.

Amongst the former stand pre-eminently—the general richness of the soil,—the facility presented by a hardy and numerous population, of procuring labour at a cheap rate,—the internal resources of the country,—and the advantage of the English market for the export of cattle and corn; amongst the latter,—a dislike of innovation,—a rooted prejudice in favour of old systems,—want of unanimity—want of confidence,—want of resident landholders,—want of capital,—all of which conspiring with party politics and religious feuds, to render this

> "A purple land, where law secures not life;"

it cannot be matter of surprise that its agriculture should be defective,—its best practices confined to a few wealthy proprietors, and its worst continued by occupying consumers (on small patches of land, and always in poverty), or by occupying farmers without [illegible], devoid of capital to procure the necessary implements and stock, and driven by necessity to repeated cornops, till the soil, if naturally rich, is reduced to one-third of its value; and if light and poor, to a *caput mortuum*.

This is speaking generally, but, I fear, too truly. There are, however, instances in many parts of Ireland, where a good example by resident proprietors is, in a great measure, adopted by [illegible] of their tenantry who possess the means, and always with

a profitable result; and there are certain districts, where the better kind of farmers, though not versed in the improved methods of cultivation, are yet, upon land of good quality, at a moderate rent, enabled to satisfy their landlord, and obtain by their industry, if not by their skill, a comfortable livelihood. In a district of this description, the writer of this article happens to be resident, and to have been so for twenty years, which has enabled him to remark the progress of improvement in that time; very slow, indeed, but gradual, and still on the advance,—a district endeared to the historian and antiquarian by a retrospective interest which comes not within the legitimate scope of this communication, but which, time out of mind, has been of fertile quality, and inhabited by a race of industrious farmers. It lies in that part of the county of Dublin which is called Fingal, is in general a clay-loam, rich and deep, with a substratum of black limestone gravel, tenacious, and effervescing with acids,—a soil peculiarly adapted to the production of wheat, which it supplies in great abundance to the Dublin market.

Wheat is, of course, the staple crop. In its cultivation and produce an obvious improvement has taken place within the period above mentioned. At that time eight barrels, by the plantation acre *, was considered a prime return: *now*, from ten to twelve barrels †, and in some instances considerably more is not thought very extraordinary. This must have proceeded from better management, as the fallowing system has been, and is still uniformly in use. Many reasons concurred to effect this increased produce, although the system and implements still remain apparently the same ‡. Before we refer to these reasons respectively, it may be well to revert briefly to those distant circumstances which roused the spirit of Irish agriculture from the deep lethargy that hung like a night-mare on its energies. The entire country had been in darkness; degeneracy character-

* As these pages may meet the eye of some who are not versed in Irish weights and measures, be it recollected throughout, that the plantation acre contains 160 perches, each perch 21 feet.

† The barrel of wheat weighs 20 stones, each stone 14 lb. The barrel of oats 14 stone of 14 lb.

‡ On the verge of the district 14 barrels of wheat was, this last harvest, the return upon a large scale; in another instance nineteen barrels; and in a third twenty barrels, by the plantation acre.

ized every species of farming production. Instead of a prosperous result from agricultural export, which now so happily prevails, there was a bare sufficiency for home consumption; the market was supplied by the intervention of bounties, and corn stood at a premium in the capital. Some of our wisest and best men, however, had begun to direct their attention to the internal improvement of the country. Persons of scientific and practical knowledge elsewhere, had devoted their talents to the cause of agriculture. District societies had started up in many parts of Great Britain, and, grounded on their good example, the Farming Society of Ireland was established in the year 1800, under the auspices of the chief nobility and gentry of the land, amongst whom the titles of Oriel, of Sligo, and of Meath, and the names of Wynne, of Beresford, and of Grierson, with others equally zealous, should never be forgotten. This was the dawn of amendment—the date of the first introduction into Ireland of good implements, improved practice, and superior stock. That society is now no more! When the patriot and political economist contemplate the scope of its labours, the practical and comprehensive detail of its operations, and contrast, in all its bearings, the state of agriculture previous and subsequent to the institution of that society, they will acknowledge the wisdom, the energy, the incalculable benefits of its exertions, and will sanction the honest tribute to its memory, which exists in the regret and gratitude of the country.

At that time the district in question stood higher than almost any other in agricultural reputation; and in its vicinity the ploughing matches of the society were generally held: an extensive and eminent Fingal farmer, with the old Irish plough (a vile tool), and four choice horses, challenged a Scotch ploughman with a pair, and was beaten. He had the good sense to adopt the Scotch plough, and to continue to use it. A few prudent farmers followed his example, but, in general, the unwieldy old plough is that which is in use here to the present day. This brings us back to account for the obvious improvement in the fallow-crop, which may be resolved into the circumstances of those very ploughing matches. Though the implements themselves were not adopted by those who attended, yet many useful hints were carried home and acted upon. There

is a pride and prejudice attached to old habits, especially in farming, that it is very difficult to counteract; and a tardy acknowledgement of improvement generally precedes the introduction of a better system. Thus it has been in the present instance. To those ploughing matches every common ploughman, and every common plough*maker*, was sure to repair; first, in derision, again for the festivity of the day (the Irish are given to holydays), and sometimes to cheer an acquaintance, who, in the service of an amateur, had obtained a knowledge of the Scotch plough, and skill enough to carry off a prize. Thus, by degrees, they began to observe—the ploughmaker that the Scotch plough worked level instead of on its edge; the ploughman, that it was held level instead of having the right handle kept almost to the ground, and to remark, that held and working in this manner, so different from theirs, the ploughing was nevertheless handsome and correct. A favourable impression would thus be naturally received, and the ploughwright would begin to make his cumbrous machine (which, to this hour, they maintain to be the best) a *little nearer* the level working, and the ploughman would be led to change his hand in the same proportion, and so, by degrees, from these causes, the work is better done, the furrow-slice more correctly cut, and the whole surface more uniformly turned.

To this gradual change in the old implement, and in the skill of the ploughman, the improvement in the crops must be attributed, aided, indeed, where it is practised, by an admirable method of finishing the wheat-sowing with a *double* shovelling. This is done after the field receives its first shovelling, by ploughing in the furrow with a cutting-plough, drawn by two horses, one before the other. The plough is to go and return close to the sides, and at six inches deep, thus furnishing fresh mould and preserving a narrow furrow, the shovelling being completed from its depth instead of its width; and it may be observed, that if the mould be thus raised in dry weather, it can be shovelled on the ridge with good effect, even after having rain. In this retentive soil furrows are absolutely necessary; and by the foregoing method, the extra covering for the ridge is produced with nearly as little waste of ground as by the common water-furrow drawn with the plough.

A further reason, which appertains rather to an improved succession than to amended implements or culture, appears to have its due share in the profitable change we have remarked. *Formerly*, the rotation practised was,—first year, fallow; second, wheat; third, oats; fourth, oats. *At present* it is thus,—first year, fallow; second, wheat; third, oats with clover; fourth, clover. Sometimes inverting the two latter crops and proceeding to fallow again.

The introduction of clover as an intermediate and meliorating crop, to be ploughed in the second year, is a manifest advantage; and altogether the acreable produce of wheat has been considerably increased. This apparent prosperity, however, is marred and frittered away by the extravagant and wasteful use of horse labour. The clumsy plough, though in some degree improved, as has been mentioned, effectually resists the power of a pair, and must be dragged by four horses at least in the lightest ploughing, and in general by six. These are of a shabby description, ill-fed and lean, inadequate to heavy work, to which many of them fall victims. An extensive farmer here, on 350 acres, plantation measure, of which he may perhaps have 150 under the plough, is in the habit of keeping from thirty to forty horses of this kind, and of losing one-third of the number every year by poverty and overwork. This must be a sad drawback; for though the metropolis frequently furnishes a cheap mart for cast off horses, yet, in the winter they must be fed on something besides grass, and the farmer's profit must sink in proportion to their numbers. Here, then, is a disgraceful feature in agricultural practice, only to be equalled by the rude and discreditable harness with which the miserable team is yoked: halters of cord, collars and backbands of twisted straw! this, too, not only here, but close to the metropolis, and in the immediate vicinity of many gentlemen, whose well cultivated demesnes are worthy of farming imitation. But, alas! where slovenly habits prevail, capital is seldom known to exist. With the middling class of occupiers, this want creates a never ceasing struggle; if able to pay annually the demands upon the land, and to keep their families supplied with meal and potatoes, they consider themselves fortunate. Few are able to do so, and in general a heavy arrear of rent hangs over them. Not so with

he higher class of landholders who have enjoyed their farms for rears at moderate rents, and whose acquired affluence now supplies all the comforts and necessaries of rural life. Good implements (amongst which are to be reckoned the thrashing-machine, roller, Scotch plough), good horses, good ploughmen, and useful stock, in proportion to the extent of the farm. The stock, however, are entirely dependent upon grass, hay, and straw, for their provender.

As yet, amongst the farmers, there is no attempt at turnips, cabbage, mangel-wurzel, or any green crop. The few who stall-feed give potatoes. The grass-land, however, yields a fattening pasture, and excellent meadow, especially that which has been cultivated for potatoes. The potato-crop is succeeded by wheat or oats; and if grass-seeds be sown with the former, or clover and grass-seeds with the latter, a good meadow, or choice pasture, will be obtained the ensuing year. A rich soil sometimes encourages indolence, particularly where manure is scarce. In the district spoken of, the distance from the city is too great for drawing manure. The generality of farmers have seldom more than is sufficient to grow potatoes for the family. They sell their straw! and seldom house their cattle. This renders the fallowing system indispensable in order to procure wheat, oats and clover in rotation, without the aid of manure.

In this respect, the practice is very deficient. The crops of wheat are extensive; and if the straw, instead of being sold, or burnt as fuel (which it sometimes is), was judiciously converted to manure, and stall-feeding more generally practised, much of the costly process of the fallow, consuming two years' rent, and triple labour, might be saved. In some instances, the limestone-gravel raised from the ditches and drains is drawn out upon the fallows; rarely, however, and to no great extent. The chief reliance for a good crop is upon the reiterated operation of the plough, and the natural fertility of the soil. It is otherwise in situations nearer to the city, from whence the portage of manure is convenient. In these cases, fallowing is never practised. The wheat crop is made to succeed that of the potato, and an exuberant return is the result, sometimes even to the extent of eighteen or twenty barrels on the plantation acre. This, however, is not very common; but the land, from frequent manuring, and from

its natural quality of soil, is always in heart, and, of course, always productive. In specifying these great returns, it is not intended to represent them as *general;* neither to have stated the more moderate arable produce, before alluded to, as an *average* produce. They are to be taken as the result of good cultivation and good soil. In all extensive districts, some instances will occur of indifferent tillers, and of inferior veins of land. In such cases, the produce may be from four to seven barrels an acre. This would lower an *average return;* but that is not here required, our object being to shew the state of cultivation and of soil as prevailing *in most instances.* Neither is calculation made upon an *average of seasons*, which, for the present purpose, would be useless and indefinite. We assume that circumstances are favourable, and we deprecate the blight and mildew,—the fall of rain upon the wheat in bloom,—the humid harvest, and the sprouting ear. These are the farmer's drawbacks. Never secure from disappointment, he meets it like a man, and renews his labours with alacrity. Then let him not be grudged or envied by landlord or by agent the most abundant produce that a prosperous season yields; if industrious and well-conducted, he deserves it all. The wheat crop, the first of the rotation, may not be dismissed without noticing in detail the stages of its cultivation, as furnishing, for so much, the most accurate statement of the farming habits where it grows. From a comparative view of agricultural practice in different counties, or even in different districts of the same county, much improvement may result to each reciprocally; and on this principle turns the utility of communications of this nature, and the value of their condensed and periodical circulation. Hence even Scotland, mistress of the art, may yet condescend to glean from dilatory, distracted, poverty-stricken, but *fertile* Ireland, some germ of improvement, some [illegible] habit of rural practice worthy of a place in her distinguished code of agriculture.

First as to the fallows. When the wheat-sowing ends, the fallowing commences, sometimes earlier, according to circumstances. According to the rotation above mentioned, it takes place on the oat-stubble or clover-ley; but where this regular succession is not observed, whatever part of the farm appears most suitable, whether stubble, meadow, or pasture, is broken

up for fallow-wheat. The first ploughing, probably in October, is laid up very high in fourbout-ridges, to receive the benefit of the winter's frost. This ploughing is generally performed by six horses. When the spring-crops are in ground, the second stirring of the fallow proceeds, usually in March, or early in April, by what is termed *bursting*, or ploughing the ridges back again in the same direction, after their being well levelled with the brake. Four horses are generally used for this purpose. In this state it remains till July, or early in August, when the heavy brake, drawn by four horses, and followed by lighter harrows, ill-constructed, is worked across the ridges, and is succeeded by a very deep ploughing in the same direction across, which is termed *gorrowing*, by which threebout ridges, narrower than the former, are thrown up remarkably high, to the influence of the sun and air. The ploughman in this stage being even less attentive than in any other to the rectangular operation of the plough, intentionally leaves as great a surface as possible exposed, by the high and nearly perpendicular position of the wide-cut furrow-slice *. In this stage of the work, six horses are always made use of. Thus it remains till September, or the beginning of October, when it is *thrown down* by the plough in two-bouts, made level and fine with repeated cross-harrowings, and receives its final ploughing with four horses, in a direction opposite to the last, and corresponding with that in which the ridges were originally formed. This is termed *backstirring* or *stretching*, by which the ridges are struck out, of a suitable width, according to the dryness or wetness of the soil, leaving between them a double-bout unploughed till the time of sowing, when all the field is sown with the harrow, and shovelled from the furrows. This terminates the laborious preparation for the wheat crop, which also includes the destruction of weeds and couch-grass at each harrowing; nor can any part of the world exhibit cleaner fallows, notwithstanding the natural tendency of the soil to the production of grass and weeds.

The quantity of seed by the plantation-acre is, upon fallows, uniformly one barrel, and on potato-ground from fourteen to

* We may here mention, that, in the first volume, page 418, of the Quarterly Journal of Agriculture, is a paper, in which it is mathematically demonstrated, that the furrow-slice exposes the greatest extent of surface to the action of the sun and air, when it is inclined at an angle of 45°.—Edit.

seventeen stone, according to the time of sowing, increasing the quantity in proportion to the lateness of the season. The kinds sown are limited to four,—the Old Irish Wheat, the Red Lammas, the White Lammas, and the Velvet or Cone Wheat. The two first sorts and the last always upon fallows. The White Lammas is chiefly sown after the potato-crop. The Irish is in great esteem, as hardy and productive, with a handsome, close, and thin-skinned grain, the straw white, like that of the White Lammas, and the kernel red. The Red Lammas is considered the most certain for a crop, and also for the market. The White Lammas, sown upon potato-ground, yields a beautiful grain, and exceeds the two former in produce nearly one-sixth. It is itself exceeded in return by the Velvet Cone Wheat, commonly, but erroneously, called Buck-wheat here. In price, however, it falls short of the Red Lammas as much as the White surpasses it, in general from three to four shillings a barrel. The marketable objection to the Cone Wheat is its thick and branny skin, of which the kind used here, though much improved, considerably partakes. It is nevertheless sown by many; with a neighbouring gentleman, who has used it for years, it has seldom failed to yield sixteen barrels by the plantation-acre.

The next operation is *weeding*, which, from the great cleanliness of the fallows, gives but little trouble, and, in many instances, not any. Then comes on the *reaping*. This is always done by task. The districts being thinly peopled, the farmers are obliged to employ groups of itinerant reapers, who have not sufficient employment in their own more populous counties, and are glad to put a little money together in this way, which they bring back unbroken, being well provided with diet by those who employ them during the harvest. They are also furnished with blankets, in a comfortable barn, with abundance of fresh straw. The wages by task for wheat and oats, all round, is from 9s. to 10s. per acre (plantation measure), for reaping, binding, and stooking; *i. e*, putting up into parcels of ten sheaves in each, and one on each side across the furrow to admit the air, and two hooding-sheaves to exclude the rain. When employed by the day's work, the labourers have, in most seasons, from 15d. to 18d. a day, with the same diet as when employed by task, which consists of potatoes, milk, stirabout,

butter, wheaten or meslin * bread, and bacon on Sundays. The same sets of men come year after year to the same farmers, and are, in general, very well conducted. Where reaping is done by the piece, without diet, which is in very few cases, it must be executed by the labourers of the country, who can provide themselves. The uniform charge is eighteen shillings per acre. Should the weather be steady, the farmer draws home the wheat in stook; if unsettled, he secures it in field-stacks, containing from two to three barrels each, which will remain a long time, without injury, until it is his convenience to bring them to the stack-yards. There they are consolidated into large ricks, upon safe stands, and are carefully thatched, so to remain, till brought by degrees into the barn. The thrashing also is executed by task, at 15d. a barrel for wheat, and 6d. for oats; the taskmen tying the straw for market, and the farmer winnowing the grain. It is generally sold by sample at one market, and delivered to the purchaser before the next. The advantage of this is, that, should the factor think it imprudent to make sales on that day, the grain may rest at home, to wait a better price; but this is often counterbalanced by the loss suffered, should a fall take place between the sale by sample, and the delivery of the parcel—the merchant generally making a considerable drawback for alleged inferiority, to which the farmer must submit, or resist it by a proceeding before the chief magistrate, while his horses, men, and corn, are delayed for an adjudication. The market-man has additional wages the day he drives. The wretched horses have the double journey to perform, besides the delivery at distant stores or mills, without being fed, or even rested in a stable. This is another reason for their bad condition, being always severely driven on their return late at night, and being frequently twenty hours under the drays, without refreshment.

The preparation, growth, and disposal of the wheat crop, being thus terminated, the profit and loss should be stated, to shew what the farmer really obtains by his industry in this branch of cultivation, to which he is tempted, sometimes at a decided loss, by the prospect of thus making up a bulk sum from the produce of the farms, to defray the rent, and other necessary charges.

* Wheat and rye mixed and grown together. Stirabout is porridge.

Wheat Crop or Fallow, at the Rates of January 1833.

Dr.				Contra.			
To 2 years' rent, 1 acre,	L.5	0	0	By 10 barrels of wheat, at 26s. . .	L.13	0	0
To 4 ploughings, harrowings, and sowing, . .	3	0	0	By 2½ tons of straw, at 20s.	2	10	0
To shovelling . .	0	4	0				
If a second time, .	0	4	0		L.15	10	0
To seed, 1 barrel, .	1	10	0				
To weeding, . .	0	3	0				
To reaping, binding, and stooking, . .	0	16	0				
To stacking, carting, ricking, and thatching, . .	0	10	0				
To thrashing 10 barrels, at 1s. 3d. per barrel, .	0	12	6				
To winnowing, sacking, and loading 10 barrels, .	0	2	0				
To carriage, at 6d. per cwt.	0	12	6				
To commission to factor, at 6d. per barrel, .	0	5	0				
To porterage, at 3d. per do.	0	2	6				
	L. 13	1	6				
Profit on one acre, .	2	8	6				
	L. 15	10	0		L. 15	10	0

This shews the small profit to be gained on fallow-wheat. Let it be compared with that upon wheat grown upon potato ground.

Dr.				Contra.			
To 1 year's rent, 1 acre,	L.2	10	0	By 16 barrels wheat, at 26s. . .	L.20	16	0
To 1 ploughing, harrowing, and sowing, . .	1	5	0	By 4 tons of straw, at 20s.	4	0	0
To shovelling, . .	0	4	0				
If a second time, .	0	4	0		L. 24	16	0
To seed, 15 stones, .	1	2	6				
To weeding, . .	0	0	0				
To reaping, binding, and stooking, . . .	0	16	0				
To stacking, carting, and ricking, . . .	0	12	0				
To thrashing 16 barrels, at 1s. 3d. per barrel, .	1	0	0				
To winnowing, sacking, and loading, . . .	0	3	0				
To carriage, at 6d. per cwt.	1	0	0				
To commission at 6d. per barrel, . . .	0	8	0				
To porterage, at 3d. .	0	4	0				
	L. 9	8	6				
Profit on one acre, .	15	7	6				
	L. 24	16	0		L. 24	16	0

Profit on potato ground wheat, . .	L.15	7	6
Do on fallow wheat, . . .	2	8	6
Difference of Profit, .	L.12	19	0

This, it would seem, should exclude the fallow system, where it is practicable to do so. It might be done even here, in a great measure, by refraining from selling or burning the straw, and by the introduction of a soiling system for the stock of the farm. But, alas! no great prospect of such improvement as yet presents itself.

The *Oat Crop* is the next to be considered. In the month of February or March the wheat-stubble receives one sound ploughing, upon which the oats are sown and well harrowed. Where the ground is wet the furrows are shovelled, but not deeply, to avoid accidents, where sheep are to pasture on the succeeding clover. The quantity of seed for the plantation acre seems exorbitant—two barrels of fourteen stones to the barrel! But this has been the practice, time out of mind, in all descriptions of soil; nor could the farmer be induced to alter it. The kind of oats usually sown is the Poland—not being so liable to shake as the potato-oat, and not requiring so rich a soil. The black oat also is becoming popular, as yielding a heavier crop. It is also recommended by its holding a steady price at market. Lately has been introduced, by one person, the black oat of Hungary, received through the importer, from an eminent seedsman at Paris. It has this year returned thirty barrels by the acre, where but one barrel had been sown, and that upon land which had borne oats the preceding year. This is a thin-skinned oat, not liable to shake, and ripens early. The straw is abundant, the height nearly five feet, and so strong in the stem, as not to be beaten down by bad weather. From seventy to one hundred and fifty grains was the general produce of each ear. This oat is much sought after at present for seed, and will probably come into general use. The return of barrels by the acre, in this district, varies according to the previous preparation of the soil. Where the oat crop follows wheat that has been grown on fallow, the produce seldom exceeds from twelve to fourteen barrels by the acre. Where it follows wheat that has been sown on potato ground, it yields from fifteen to eighteen barrels, and, when sown immediately after potatoes, it will return from twenty to twenty-five barrels by the acre.

This brings us to the third crop of the succession,—Clover. It is sown at the same time as the oats, and covered with the last stroke of the harrow. The quantity of seed is generally

fourteen pounds, ten of red, and four of yellow clover; this, if it is to remain but one season. For more permanent meadow or pasture in addition to the clover, are sown, from eight to ten barrels (thirty gallons to the barrel) of mixed hay-seeds, and the produce is abundant. The hay-seeds, if procured within the district, are of excellent quality, the natural grasses being those most approved, the *Alopecurus*, *Dactylis*, *Holcus*, *Phleum*, *Lolium*, *Anthoxanthum*, and all the *Poas*. Half a crown by the barrel is the usual selling price. They are lower in Dublin; but if purchased there from the promiscuous collection of the hay-lofts abounding with seeds of weeds, there is often great disappointment. The farmers now begin to adopt the practice of laying down their best soils with grasses, to be broken again, but not in the ensuing year, by these means obtaining a frequent supply of their own seeds; should this interrupt the course of the succession of which we have been treating, they are obliged to make their fallows elswhere, and this has led to breaking up the old meadows,* their place is better supplied by the *new*, and the produce more sought at market. Hay of the second year well saved is sure to command the highest price, especially if in the first season the new grasses have been pastured by sheep.

Haymaking is executed here in a rude and unscientific manner, yet when the weather is not very bad, it is got into a state of safety. What is considered *a state of safety*, is that state in which it may be put up dry into such field cocks, as will preserve it for a time from injury by rain. The colour, however, seems to be all through a secondary consideration. The process from the scythe being in most cases, as follows:—The mowing once begun is persevered in through all changes of weather, being performed by task, and at the rate of from four to five shillings an acre. The swath, instead of being tedded and turned and got off the ground into small cocks, as expeditiously as possible, to preserve the sap and colour of the hay, is suffered to remain untouched, and to bleach and wither in that state for three, four, or five days in the best weather, and for

* An extensive farmer has this last year broken up with one ploughing, both meadow-land and pasture for ley wheat. The seed was sown in October, upon a sod of five inches thick, the furrows deeply trench-ploughed l shovelled. It now wears (January 1833) a most verdant and promising ppearance.

many more, should it be broken. By this exposure, the colour becomes greatly injured, the upper surface being white, and the lower yellow, before the swath is shaken out. This first process is always performed with forks and sticks instead of being shaken out by the hand, and thus the swath is not sufficiently separated, and remains throughout the succeeding stages, unequally coloured, and unequally dried. The next operation is to turn the grass thus shaken out, once or twice, then to gather into windrows, and put up into grass cocks, ill formed, and too large. These are suffered to remain till carried into squares by two men with two forks under each cock, and *plotted* for *tramping*, which means, shaken out into a square plot, and turned previous to being made into trampcock. This latter cock, which generally contains from fifteen to twenty hundredweight, is made (after the plotted hay is pushed or carried into narrower compass) by three men, one laying and tramping the hay, one forking, and the third raking. These to save time in finishing, are left for many days perhaps, in large and shapeless masses, which in the end, are pulled, topped, raked and roped, to stand safe till the farmer can find time to draw them home. This latter operation is frequently too long delayed, and it is obvious that when so great a surface is exposed, much loss must be suffered from evaporation, exclusive of the inroads of cattle, and the damage by wind and rain. In slovenly practice it is not unusual, when pasture fails, to turn the overworked horses into the after grass, before the hay is removed. The cocks are thus submitted to the caprice of *their* appetite, and animals, having had nothing but grass for the entire season, prefer the variety of dry fodder, and deface the cocks of hay, in a manner as costly as disgraceful to the injudicious proprietor. The next process is the drawing home. This is done chiefly when no other business interferes, and the hay-yards are soon furnished with handsome ricks or pikes, well formed and well secured against future damage. There has been but one attempt at carrying to the rick without previous tramping. This was made by a new settler last summer, in fine weather, and succeeded to admiration. There are causes, however, *natural* and *practical*, which would render this management in general, dangerous here. Of the *former*, the humidity of the climate, with the sappiness and luxuriance of the herbage, of which the

plantain, or ribbed grass, difficult to save, is frequently a component part. Of the *latter*, the bad practices alluded to before, by which the unequal separation of the swath, causes portions of it to adhere together in a crude state, that if early carried must of necessity set fire to the rick. This remark is intended to apply to natural meadows only. The artificial, not having too great a proportion of clover, are capable of being early carried with perfect safety, without being made into trampcock. The final process is the transport to market. This was formerly done by loading upon cars the statutable weight of *four hundred!!* Any deficiency caused the forfeiture of the load. This often took place from the plucking of the horses, and the depredations of roguish boys, or from the wilful misloading of the more roguish farmer, who gave the highest wages to the man who could put the least hay into the greatest compass, to escape the scrutiny of the market supervisors. In consequence of these methods, the farmer was frequently punished and the purchaser as frequently cheated. The waste of labour also, both of men driving and of horses drawing loads so many and so light (suited only to an ass's cart), was deplorable. It is matter of satisfaction to the writer of these few observations that, with others equally zealous, he was instrumental in establishing sale by weight in the haymarket of Dublin; by which one horse (according to the distance) is capable of performing the work of three, four, or five, and the inhabitants of the metropolis are more honestly and cheaply supplied by redundant markets. A still farther improvement was attempted and failed. Premiums were offered for hay brought to market in trusses, as in London. These premiums, however, were only obtained in one or two instances. The defective mode of haymaking which generally prevails, evaporates the mucilaginous juices, and pre- sufficient adhesion of the hay in the rick, to stand the trusses comprising a given weight within practice of course has not been adopted.

A few of the circumstances of this district have now been examined, in which some good and many bad habits, remarked. It is to be hoped that the latter will gra- ly disappear, and that a soil so capable of rich production, ay, by excited industry and improved culture, at some future ay arrive at the excellence of East Lothian cultivation.

ON SMUT IN WHEAT. *By Mr JOHN DONALDSON, Donnington Park, Leicestershire.*

THE diseases of corn seem to have attracted the attention of the earliest writers on agriculture, and diseases similar to smut and blight in wheat have been mentioned by Pliny and Columella; and even at that early period, mixtures of water and urine, and a decoction of cypress-leaves, are recommended as specifics; and Virgil has mentioned the leys of oil. It is doubtful, however, if the diseases were exactly similar to those of our country, as the climate and other circumstances must have very considerable influence in altering, or at least in modifying, the appearance of the disease. It appears that both Italy and Sicily are subject to such diseases; and specimens of wheat from New South Wales, shew that much mischief has been done there by some similar affection of the plant.

Though no writer of note on the subject of rural economy has failed to state his opinion on the origin of the evil, it is doubtful whether any one of them has attributed it to the real cause. It has been long known to botanists, that the disease in corn called blight is occasioned by a parasitic fungus on the leaves, stems, and glumes of the plant. In the year 1767, Felice Fontana published an elaborate account, with microscopic figures, (Osservazioni supra Ruggino del Grano. Lucca, 1767. 8vo.) More modern botanists (Sowerby's English Fungi, vol. ii. tab. 140, Wheat, tab. 139, Poa aquatica), have given figures both of corn and grass affected by it, but they have not used high magnifying powers in their researches. The late Sir Joseph Banks published a very scientific account of blight, accompanied with plates explanatory of the different stages of the disease, in which it is asserted, that the seeds of the fungus gain admission into the pores of the plant, and obstruct the circulation of the sap intended for the perfection of the grain. It has been long credited by farmers, that the barberry plant causes the blight in corn; and it is notorious to all botanical observers, that the leaves of the barberry are very susceptible of the attacks of a yellow parasitic fungus, the seeds of which may

be transferred to the corn. But after all these researches, the cause of blight is ascribed to various agencies, for rust and mildew have been ascribed by very intelligent writers to atmospheric influence, over which human agency can have no control.

In regard to smut, Mr Jethro Tull ascribed it to moisture, and recommended as a cure his favourite drill husbandry. Mr Duhamel has enumerated at length the different opinions and experiments on the subject of smut, and concludes with observing, that smut powder is highly infectious, and recommends leys of lime, saltpetre, alum, verdigris, salt, and the ashes of plants. Dr Hales, suspecting that it might proceed from injuries in the grain arising from bruises, made an experiment with bruised grains, which convinced him that that was not the cause. It has also been ascribed to damp weather during the period of flowering, in which the farina from the anthers may have been washed away. In the memoirs of the Bath Agricultural Society, it is remarked that smut is not produced by any infectious substance, or by the ova of insects that may adhere to the grain; as sound and smutty ears are found proceeding from the same root, and sometimes sound and smutty grains are contained in the same ear. It is hence inferred, that it proceeds from the want of due impregnation, in consequence of the farina fecundans becoming faulty, if putrefaction take place in the seed-corn when it dies. And this opinion is supported by the experiments of Spallanzani, who discovered that the seed is produced anterior to impregnation, which can only take place when the flower is open, and the dust of the anther fully ripe. It is therefore conceived, that for want of impregnation, or the vivifying principle, the embryo wheat corn may putrify, as in the case of the addled eggs of oviparous animals. (Darwin's Phytologia, p. 323). The inquiries of Mr Somerville, in the same volume of Communications to the Board of Agriculture, are favourable to the opinion that the disease is occasioned by the depredations of an insect. Repeated experiments in rubbing sound grains with smut powder, convinced him that it is very infectious, and that washing is essentially necessary to avoid the infection. In the course of his researches, by using highly magnifying lenses, and by concentrating the light of the sun on the object, by means of a concave mirror, he discovered that the

specks on the balls were real insects, resembling wood-lice in shape. He then conceived, that when the smut powder comes in contact with sound grains, it adheres to them, and inoculates them, so as to render the plant incapable of producing any thing but smut. It is not easy to comprehend how this takes place; and although his active and ingenious mind has advanced very plausible reasonings in support of his theory, yet his speculations have not materially advanced the knowledge of the real cause of the disease. Linnæus, Walker, and other naturalists, are of the same opinion, that insects cause the smut, and they are apparently supported by the circumstance of certain pickles being found to cure the malady. In order to bring Mr Tull's allegation as to moisture to the test, M. Tillet planted a tuft of wheat in earth kept very moist, and had not one smutty ear. He is of opinion, that it does not proceed from any inclemency of weather, or want of impregnation, because it takes place before the ears have appeared. M. Aimen contended, that an ulcer, which seizes the blossom, causes smut, and agreed with some writers, that though smut powder is infectious, infection is not the only cause of disease, as wheat from the same ground, taken out of the same sheaf, and sown without steeping, produced sound wheat in some fields, and in others smutty. He is well assured, that it is not caused by insects, or by the wetness or dryness of the soil, or by any deterioration of the sap, as the rest of the plant is well formed. He thought that the grain might become mouldy in the soil, and produce smut. But it is difficult to conceive how this can produce smut, as, after the seed-corn is exhausted, the plant no longer draws subsistence from it, and whether it die or not, seems of little consequence; or how mouldiness should destroy only the organs of fructification, without sensibly affecting the rest of the plant. Sir H. Davy is of opinion, that smut is produced by a small fungus on the grain, as the products it affords by chemical analysis are similar to those afforded by the puff-ball (*Lycoperdon*), and thinks that without the agency of some organized structure, so complete a change could not be effected in the constitution of the grain. Wolfius thought that smut proceeded from a monstrosity of the embryo; but this supposition has been refuted, as the male flowers of certain plants are affected by it, and

flowers have no embryo. In the second volume of the Museum Rusticum, a correspondent observes, that several black ears grow up among the wheat, and are detained too long in the hose, and by the natural humidity of the plant, a fermentation is produced, which destroys the small vessels, and renders their contents black, dry, and dusty,—that these vessels burst, and the dust which is thrown off enters the stigma of healthy corns, and infects them. This theory may be ingenious, but it surely ascribes too precarious a cause to so certain a disease. Lisle, in his Observations on Husbandry, thinks that smut proceeds from a total want of sap at the root of the plant, and that the disease only overtakes the grain when it is well advanced towards fulness. The author of the Yorkshire Farmer maintains that smut is occasioned by worms, and that experiment clearly showed him that it is not infectious in the smallest degree. The result of a great number of trials on smutty wheat, gave Mr Arthur Young little reason to think that the powder was the result of it. Ellis has enumerated no less than ten probable causes, and concludes that want of nourishment at the root may be the primary one. Dr Home, in his Principles of Agriculture and Vegetation, says, that smut arises from an over-abundance of juices, and it may be communicated to healthy grain, and may be prevented by pickling the seed. According to the analysis of Fourcroy and Vauquelin, smut-ball contains: 1. A butyraceous, fetid, and acrid oil, about one-third of its weight. 2. A vegetato-animal substance, about one-fourth or less, similar to putrefied gluten. 3. A coal, about one-fifth,—a clear evidence of putrid decomposition. 4. Free phosphoric acid, in a very small proportion. Lastly, Phosphates of ammonia, magnesia, and lime, in the proportions of a few thousandths only. From this analysis no conclusions can be drawn as to the cause of the disease, or its contagious nature.

The author of the New Farmer's Calendar, after a great deal of superfluous reasoning on the subject, thinks that smut is the highest degree of blight, and proceeds from an atmospheric stroke. In proof of its not being infectious, he quotes several authorities, and particularly an experiment made by Sir John Call, in Cornwall, where, out of about three hundred ears that grew from the stocks of infected wheat, only two smutty

ears were found. But in opposition to these authorities, other proofs equally strong in support of a contrary doctrine have been adduced. In Chalmers' Cyclopedia, the disease is ascribed to rankness and fatness of soil, and to the use of fresh dung, and Mr Bradley calls it a blight. Some have thought that it proceeds from a dense glutinous vapour that descends on the plants betwixt the setting and rising of the sun, and binds the valves and obstructs vegetation, and as the young grains cannot thus experience the influence of the air which is necessary for maturation, they consequently become rotten heaps of putrefaction. Others imagine that when two or three stalks grow from the same root, a deficiency of nourishment may cause the smut. Some authors confound smut with mildew, calling the one red mildew, and the other black; others consider them distinct, and arising from different causes, and think the mildew the worst. Fontana was of opinion, that the black mildew or smut arises from real vegetables perhaps of an imperfect kind; and that these, by absorbing the nutritive juices, enfeeble the plant, and produce the injury complained of. Willdenow thought that smut proceeded from a fungus which multiplied so as to occupy the whole ear, (Principles of Botany, p. 356); but F. Bauer of Kew ascertained it to be a morbid swelling of the ear, and not at all connected with the growth of a fungus. (Smith's Introduction, p. 282.) M. Prevost ascribes it to a microscopic vegetable of some sort; and Jussieu says, the proximate cause of smut may be attributed to infection of the seed, by the dust of the smut ball (Lycoperdon globosum) in whatever manner the disease may be transmitted from the seed corn to the ear. If the seed be prepared by the application of caustics, though it may not altogether prevent the smut, the disease will not materially affect the value of the crop.

These numerous conflicting opinions as to the cause of smut, render it impossible to recommend any certain mode of investigation to clear up this perplexing subject, and after all that has been written upon it, the cause of this disease in the cereal crops may be regarded as one of those arcana of nature, with which the human mind will probably never be intrusted. Not one single opinion has been advanced on this subject, that has not been refuted; so that it would appear the more we inquire into the

mysteries of the works of nature, the more are they presented to the human mind in a perplexing form.

On rich lands that yield much straw, over luxuriance or stagnation and corruption of juices gives a probable appearance of the cause of disease; but smut is equally prevalent on poor soils not yielding above fifteen bushels per acre. Clean wheat has been sown on different fields and farms after undergoing the same preparation, and it has produced smutty wheat in one instance and clean in another. And it is remarkable that on contiguous farms of the same quality of soil, and with exactly the same preparations of land and seed, smut is constantly produced on some, and is never to be seen on others. But from whatever cause it may arise, there is sufficient reason to believe that it is contagious, and therefore the utmost care is necessary to separate the smutty wheat from sound, so as to prevent the spreading of the evil. Tull has related that the use of salt brine as a pickle was discovered by the sowing of wheat steeped in salt water, which had been taken out of a ship that had sunk near Bristol, and which escaped smut, when nearly all the wheat in England was infected.

It will be unnecessary to enumerate all the different receipts prescribed by authors for the prevention of smut; a few of the most common will be sufficient. A solution of common salt in water, strong enough to carry an egg, sometimes mixed with nitre and copperas, in which the wheat is steeped, the light grains being carefully skimmed off, and dried with quicklime and then sown, forms a good receipt. A decoction of the water of tobacco, hellebore powder, and Barbadoes aloes has been much recommended; also a solution of arsenic in water, and a mixture of water, woodashes, and potash, in the proportion of 8 lb. to 100 pints of water. Signor Scandella, an Italian physician, recommended a mixture of water, woodashes, alum, vitriol and verdigris, boiled for an hour, in which the wheat is steeped, and then mixed with quicklime. In Norfolk the salt is dissolved in a small quantity of water, barely sufficient for the purpose; the lime is slaked with this solution, and the wheat is dried with it in its hottest state, having been previously moistened with pure water. In Yorkshire, one ounce of white arsenic finely powdered is boiled in a gallon of water for

two hours, and stale urine is added to increase the quantity to two gallons, then the wheat is steeped in the liquor, and encrusted with quicklime. In the south of Scotland and in the north of England, stale urine free of any mixture is generally used, and in a practice of forty years, Messrs Culleys used this preparation, and never had any smut. A tub holding a bushel of wheat, with a tin bottom, pierced with holes, is immersed in the tub containing the urine, and after the wheat is repeatedly stirred and the light grains skimmed off, it is thrown on a clean floor encrusted with quicklime, and sown immediately. A short time only must elapse betwixt this preparation and sowing, as the corrosive quality of the volatile alkali with which stale urine abounds, will destroy the vegetative power of the seed, especially if quicklime be added. Urine differs in composition according to the state of the body, and the nature of the drink and food made use of. According to the analysis of Berzelius, 1000 parts of urine are composed of

Water,	933.
Urea,	30.1
Uric acid,	1
Muriate of ammonia, free lactic acid, lactate of ammonia, and animal matter,	17.14
The remainder different salts, phosphates, sulphates, and muriates.	

Putrid urine abounds in ammoniacal salts, which, according to the experiments of Sir H. Davy, are injurious to vegetation except in very small quantities. It is therefore supposed that the pickles are useful, not for any invigorating quality they possess, but in correcting by their corrosive nature any noxious quality adhering to the grain, and in destroying the insects which some have supposed to be the cause of the disease. In the Agricultural Survey of the county of Clackmannan by J. J. Erskine, Esq., it is proposed to destroy, by means of kiln-drying the wheat, the insects that are supposed to constitute or propagate the disease. This practice was brought from Ireland, but has never got into general use.

The following experiments with different steeps, on wheat impregnated with smut, were made in Northumberland, in which the writer was engaged under the directions of an eminent agriculturist.

EXPERIMENTS.

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These experiments, and those of Mr Arthur Young, though no doubt conducted with sufficient care, only prove the absolute merits of each, and comparative merits of the several pickles used; but trials, repeated for years, are necessary before conclusions can be drawn, as nothing can be determined from a single experiment. The expedients that have been proposed, and are now used, may be admirably calculated to answer the end, and have no doubt been productive of much benefit; but the husbandman must be cautioned as to placing too much confidence in them, so as to neglect other particulars. Smut will appear notwithstanding the utmost precautions are used, and more so in some situations than in others. A frequent change of seed is necessary, and should be chosen from a situation absolutely free from smut. If any disease has appeared, the greatest care should be used in the sweeping out of barns, granaries, and every corner capable of holding a single seed of the old grain, that the new may not come in contact with it. If these precautions are neglected, the change of seed will be useless. The seed must be carefully pickled in salt and water, or in stale urine, as before directed; and if these particulars be attended to, the experience of the most eminent and enlightened agriculturists warrants us in asserting, that the corn will be free of disease, and always clean.

This is all that is known in the present state of science as to the cause and prevention of smut; the real nature of the disease has hitherto eluded the search of the most scientific inquirers, and the veil which Nature has drawn over many parts of her works still enshrouds them beyond our visual organs. But the great advancement in knowledge that has been made in the scientific world, and the unceasing efforts of genius in endeavouring to explain the mysteries of nature, encourage us to hope that many things that have hitherto baffled investigation may yet be discovered, and that the cause of smut may soon be as well known, as various natural phenomena which half a century ago were "but seen as in a glass darkly." But on these subjects it would be as presumptuous to be sanguine, as unphilosophical to despair.

DE CANDOLLE'S THEORY OF THE ROTATION OF CROPS.

It is a well-established fact in the practice of husbandry, that a succession of the same kind of crops on the same piece of ground, deteriorates not only the ground, but the crops. Thus, a successive crop of wheat, barley, or oats, on the same land, destroys the stamina of the ground, and renders each succeeding crop less in produce and value. A succession of wheat, barley, and oats, frequently repeated, will produce the same effect, though not so quickly. Even a succession of green crops will affect both the crops and the soil in a similar manner, in a given time.

This deterioration of soil and crop is most perceptible when there is no intermediate application of manure. Manure will, no doubt, protract the period of greatest deterioration; but manure cannot constantly maintain a profitable return from a succession of the same kind of crop. Besides, it is impossible to obtain a sufficient quantity of manure for frequent intermediate applications, in order to counteract all the effects of deterioration. The impossibility of maintaining to perfection the same kind of vegetable on the same piece of ground in a well cultivated garden, illustrates, in a striking manner, the limited powers of manure. In the field, where the cereal crops always ripen their seed, the power of manure is still more limited. These evil effects, arising from what is emphatically and properly called *over-cropping*, have, therefore, been established beyond doubt.

To obviate the serious evil of deterioration of soil and crop, which neither labour merely, however dexterous, nor manure, however well prepared, can prevent, the adoption of a succession of different kinds of crops has been attended with beneficial results. Thus a green crop, such as grass, turnips, or potatoes, was made to succeed a corn crop; and when this alternation of crops was substituted for a successive series of corn or grain crops, experience soon discovered that less deterioration affected any crop of the series, or the land itself. It was also found, by this arrangement, that a longer period might elapse, than by the former, between the applications of manure, without diminishing the gross produce of the intermediate crops.

In the progress of experience, this beneficial arrangement of cropping was discovered not to bestow all the advantages of which the alternate system was capable. It was well to cause the gentler sway of the green crop succeed the severer energies of a corn one; but it left the important question undecided, whether the particular corn crop selected was the most proper one by nature to follow its predecessor. Thus, it would be an improvement on the old series of cropping, to make wheat follow grass, barley after potatoes, and oats succeed turnips; but is wheat the best successor to grass of any of the corn crops? and, in like manner, a similar question might be asked of the rest of the series. Experience again suggested, that a better arrangement might be followed. It said, let wheat follow a bare fallow, potatoes, or beans; let barley succeed the turnip, and let oats be taken after the grass.

The trials of experience suggested yet better arrangements, to secure the greatest produce of the different kinds of crops. It was soon discovered that all kinds of soils were not adapted to the most luxuriant growth of all the kinds of crops. Thus a clay soil was found to suit wheat better than barley; a bare fallow better than turnips; and beans better than potatoes. A gravelly soil, on the other hand, was most suited to those crops which were rejected by the clay soil.

All these different changes and alternations suggested by experience, in the succession of crops, and the soils which are best suited to them, produce this irrevocable result:—that a particular corn crop shall succeed a particular green crop, on the soil that is best adapted to them; and that manure shall be applied, at given intervals, with one of the green crops, or with bare fallow. Thus, on strong soils, wheat must follow a manured fallow, grass after wheat, oats after the grass, then beans after oats, and wheat to precede the manured fallow after the beans. On weak soils, barley succeeds to turnips which have been manured, grass follows the barley, and oats precede the manured turnips.

Experience having proved that these successions of corn and green crops, on their respective soils, are best suited to insure the greatest produce, it is requisite that one series of successions shall follow another, in regular order, on its respective

soil. These series of successions are called the "*Rotation of Crops.*" Should any alteration be desired in the rotation, it can only consist of a substitution of one corn crop for another, or one green crop for another; for the corn and green crops must always stand in the same relative position to each other. But this substitution of one crop for another will generally be attended with a sensible deterioration in the crop or soil, if the deterioration be not counteracted by an additional quantity of manure. A modification may be effected in the rotation by extending the time which it occupies. Thus the rotation on strong soils, which embraces six years, may be extended to seven or eight: and that of four years, on weak soils, may be extended to five or six years. The extension of the length of the rotation must be effected alone through the gentle, or the green, and not the severe or corn class of crops; and that not by means of any of the green crops indiscriminately. Thus the extension must not be effected by a repetition of any of the corn crops; for, we have already observed, such a proceeding would hasten their own deterioration; nor by adding an alternate green and corn crop to the end of the rotation, for that would be a mere attempt to deteriorate the soil by delaying the application of manure; nor by repeating the turnip or potato crop, for neither can be raised without manure;—but it must be effected by allowing the grass to remain as many years longer as it is desired to extend the term of the rotation. The period of grass crop can alone be extended without trouble.

Experience again steps forward to check speculation in the endurance of the grass crop. On strong soils it is inimical to the grass crop to prolong its existence beyond one year, and hence annual grasses and the six years' rotation is best suited to that class of soils; whereas, an extension of the existence of grass on the weaker soils, serves to strengthen the energy of the soil. Two at least, or perhaps at least three, years of grass confers a lasting benefit on such soils. Having thus fixed upon the length of rotation which is best adapted to the soil, let it be irrevocably adhered to.

In the establishing of this beneficial system of cropping, experience alone has discovered the progressive steps which have led to its completion. The rationale of the system has never

been inquired into by those who have administered its rules or benefited by their application. The investigation of causes is the duty of the philosopher, and not of the farmer, who has only to deal with effects; but the happiest results may be anticipated from the combined efforts of both; when the former directs his mind to establish the principles upon which the experienced operations of the latter depend.

Among all the important practices in husbandry, that of the rotation of crops is the most important; for by an attentive adherence to it, the utmost regularity of work will be maintained through every department of labour. To the steady adherence of this practice is justly ascribed all the improvements on land which have attracted the admiration of every lover of his country: to it is properly attributed the regular apportionment of an invariable extent of land, which is annually devoted to the growth of culmiferous crops; and which regularly checks, as far as human means can, injurious fluctuation in the supply of the first necessary of life: and to it is accurately imputed the supply of the immense numbers of high-fed live-stock which daily grace our markets.

To the intelligent agriculturist it is delightful to learn that the discoveries of science tend more and more to develope those principles which his practice illustrates. That practice has hitherto kept "the even tenor of its way," by the guidance of unerring experience, amid the contempt of scientific reproach. It now receives its justification in the confession of scientific error.

Various reasonings have hitherto been employed by men of science to account for the necessity of a rotation of crops. It has been thought sufficient to explain all the phenomena to state, that different plants absorb different juices from the same soil, and, therefore, though the ground may be exhausted by one class of vegetables, it may be rich enough for another. But it is well known to botanical physiologists, that plants absorb all the soluble substances which the soil contains, whether injurious to their growth or not. It has also been stated as an explanation, that the roots of different plants, being of different lengths, extend into different layers of the soil, and thus derive from it adequate nourishment. But the roots of all plants must be in the same stratum at the period of germination, and it is

besides probable that all the arable part of the soil is homogeneous. It is known that plants of the same family, such as clover and lucerne, do not prosper in succession, although their roots are of different lengths. These theories are therefore not satisfactory.

To Saugmans stated, that a portion of the juices which are absorbed by the roots of plants are, after the salutiferous portions have been extracted by the vessels of the plant, again thrown out by exudation from the roots, and deposited in the soil. This idea has been more fully pursued by De Candolle, who sees in it the true theory of the rotation of crops. He thinks it probable, that it is the existence of this exuded matter, which may be regarded in some measure as the excrement of the preceding crop of vegetables, that proves injurious to a succeeding vegetation. He has compared it to an attempt to feed animals upon their excrements. The particles which have been deleterious to one tribe of plants, cannot but prove injurious to plants of the same kind, and probably to those of some other species, while they furnish nutriment to another order of vegetables. Hence why one kind of corn crop is injured by immediately succeeding another of the same kind; hence why different kinds of crop may with advantage succeed one another; hence, in short, the propriety of a rotation of crops.

To subject these theoretic views to the test of experiment, M. Macaire has made many experiments to prove that vegetables exude matter from the roots, and which are related by him in a memoir inserted in the Transactions of the *Société de Physique et d'Histoire Naturelle* of Geneva.* After various attempts to raise plants in pure siliceous sand, pounded glass, washed sponge, white linen, he decided upon pure rain-water. After cleansing and washing the roots thoroughly, he placed them in vials with a certain quantity of pure water. After they had put forth leaves, expanded their flowers, and flourished for some time, he ascertained, by the evaporation of the water, and the use of chemical re-agents, that the water contained matter which had exuded from the roots. He satisfied himself that this is the fact with respect to nearly all those plants which display their flowers.

"Several plants of *Chondrilla muralis*, perfectly clean, were

* See Edinburgh New Philosophical Journal, No. xxviii. p. 215.

placed with their roots in pure water. At the end of a week, the water was yellowish, and emitted an odour like opium, and had a bitter taste. Subacetate and acetate of lead produced a brownish flocculent precipitate, and a solution of gelatine disturbed its transparency. As a proof that this matter was an exudation from the roots, it was found that neither pieces of the root nor of the stem, when macerated in the water during the same time, occasioned either taste, smell, or precipitate.

"To prove that plants employ the excretory power of their roots, in order to get rid of hurtful substances which they may have imbibed, the following experiments were made. Some plants of the *Mercurialis annua* were washed in distilled water, and placed so that one portion of their roots dipped into a weak solution of acetate of lead, and another branch of the same root into pure water. Having vegetated in this manner very well for several days, the water was tested by hydrosulphuret of ammonia, which proved, by the black precipitate which it formed, that a notable portion of the lead had been absorbed, and deposited by the branch which dipped into the water. Groundsel, cabbage, and other plants, gave the same results. Some plants grew very well for two days in acetate of lead. They were then withdrawn, their roots well washed with distilled water, which being afterwards tested, was found to contain no lead, and then placed to vegetate in rain water. In the course of two days this water was found to contain a small quantity of acetate of lead.

"The same experiments were made with lime-water, which, being less injurious to plants, is preferable to lead. The roots being partly placed in lime-water, and partly in pure water, the plants lived well, and the pure water soon showed the presence of lime by the oxalate of ammonia; and the plants which had grown in lime, and then transferred with every precaution to pure water, soon disgorged into it a portion of lime.

"Similar results were made with a weak solution of marine salt, and with a like result. There can be no doubt, then, that plants have the power of rejecting by their roots soluble salts, which are injurious to vegetation. Experiments also proved, that the roots exuded a greater excess of matter under night than in the day. As it is well known that the light of day causes the roots to absorb their juices, it is natural to suppose,

that during the night absorption ceases, and excretion takes place."

Some of the inferences which M. Macaire would deduce from his experiments are, that the greater number of vegetables exude by their roots substances unfit for their vegetation; that the nature of these substances varies according to the families of plants which produce them; and that, some being acrid and resineus, may be injurious; and others, being mild and gummy, may assist in the nourishment of other plants.

But the most interesting experiments to an agriculturist were made by M. Macaire with the bean, wheat, and potatoe.

The bean lives well in pure water, which continues quite clear, but assumes a yellow colour. Chemical tests and evaporation detect a matter in this water very analogous to gum, and a little carbonate of lime. It was found that the water in which the bean had lived was well charged with excrementitious matter. Fresh plants of beans did not live well in it; but to ascertain whether this arose from want of carbonic acid in the fluid, or from the presence of exuded matter which they repelled, plants of wheat were placed in the water. They lived well; the yellow colour of the fluid became less intense, the residuum less considerable, and it was evident that the new plants absorbed a portion of the matter discharged by the first. Hence the practice of cropping wheat after beans is justified by this experiment.

Wheat, rye, and barley, were subjected to experiment. They do not live well in pure water, probably from the quantity of mineral substances, particularly silex, which they contain. The water in which they vegetated was clear, transparent, without colour, smell or taste. It contained some salts, alkaline and earthy, muriates and carbonates, and only a very small portion of gummy matter. As gummy matter appears to be a good preparation for wheat, and which was illustrated in the experiment of the bean, corn crops, which do not give out gummy matter, ought not to succeed each other. And as M. Macaire thinks that plants of corn reject scarcely any thing but the saline matters foreign to vegetation, it is probable that any preparation out by their own kind would be acceptable to several plants. The practice of preparing soil for corn crops by the culture of green crops is thus countenanced by experiment.

The potato lives well in water, and puts forth its leaves. The water is scarcely coloured, leaves little residuum, gives but little taste, and induces the belief that this is one of the plants whose roots secrete little or nothing of a decided character. This experiment of the potato, M. Macaire observes, was made upon a plant at an early stage of development. The experiment would lead to the inference that the potato is not a very good preparative for corn crops, which is known to be the case in practice, unless it is assisted by an extraordinary quantity of manure. All these facts tend to prove the theory of rotation suggested by M. De Candolle.

We hope the chemists of our own country will prosecute these interesting investigations of M. Macaire; and, as the present season of the year affords facilities for procuring plants for experiments, we entreat them earnestly not to permit the season to roll away without subjecting M. De Candolle's theory of rotation of crops to a severer test than it has yet received. That these experiments may tend to practical utility, we beg to suggest the following course to be pursued.

Let wheat, barley, and oats, be each subjected to a separate suite of experiments. Let it be ascertained whether the potato or the turnip affords the best nourishment to the succeeding corn plants. Experience indicates the turnip as the best. Then determine which of the three corn plants will best follow the potato and turnip respectively. Experience prefers wheat after the potato, and barley after the turnip. The oat is not a favourite after either. Let red and white clovers and rye s collectively be tried after all the corn plants. Experien to barley as the best nurse for these grasses, as they be termed according to ordinary phraseology. Let it be as certained whether the potato or the turnip is the better pre tive for the grasses. Experience is partial to the turnip. T let it be determined for which of the corn plants the g make the best preparation. Experience decidedly says It may be proper to try the grass plants singly, and fro to three years old. We presume the value of the bean pea has been already sufficiently ascertained by Should any eminent chemist direct his attention ing subject, we shall be happy to insert the d of the e riments.

ON THE DAIRY HUSBANDRY OF HOLLAND. *By Mr WILLIAM AITON, Hamilton.*

THE land in the greatest part of Holland being under the level of the sea, and of the great rivers and canals that intersect that country, to be occupied with advantage in arable culture it is generally kept in meadow; part of which is cut for hay, to supply the stock in winter and spring; and the rest of it is depastured with a few sheep and horses, but chiefly with cows. Some of the cows are fattened for the shambles, but the greatest number are kept as dairy stock. Wherever the surface of the ground, however, is above the level of the water, it is cropped with wheat, rye, rape, beans, oats, flax, hemp, potatoes. And even where the soil is a little lower than the level of the sea and rivers, part of it is dug up in some places, and cropped with potatoes, hemp, &c. But the greatest part of North and South Holland is so often overflooded with water, as to render it improper to raise winter wheat crops to a great extent.

The soil being generally rich, the herbage is luxuriant; but owing to the generally moist condition of the land, which is frequently inundated in winter, the herbage it produces is rather coarse, and many aquatic plants arise among the richer natural grasses.

There are few large estates in Holland, and but few large farms; and the land being remarkably level, it is generally divided and subdivided by ditches, or narrow canals, that receive the surface water, and serve the purposes of a fence.

The farm-houses in Holland are of dimensions suited to the extent of the land in the farm, and they are more or less elegant or comfortable, as the wealth or taste of the occupant may dictate; but they very much resemble each other. They are generally of only one story in height, but placed on so broad a base, as to afford accommodation not only for the boor and his family, but also their live-stock, milk-house, cheese-house, thrashing-floor, the whole crop, and fodder for cattle. In short, the whole farm-stead is frequently comprehended under one roof. Besides a kitchen, in which the family sit and eat, as

well as cook their food, and from which they can see their cattle during winter and spring, these houses contain at least one elegant and well furnished room, with a bed-room or two, into which they seldom enter, except on days of festivity. They have been accused of being averse to introducing strangers into their best rooms, but I found it quite the reverse, and was often shown into their finest apartment, and had wine and delicacies set before me. Their kitchens are much more tastefully fitted up than those of the farm-houses in Scotland. They have a stove of a tasteful figure, and kept wonderfully clean. The wall near to the fire-place is covered with plates of flowered earthen-ware; the mantle-piece is richly, though rather heavily, fitted up. There are some concealed beds and closets in this part of the building; while a pump-well, and a horse-gin for washing and churning the butter are both at hand, near the centre of the building.

Where milk is sold fresh, or made into sweet-milk cheese, and coagulated by the natural heat of the house, a milk-house is scarcely required. But where butter and skim-milk cheese are made, a place to cool and store the milk till it cast up the cream becomes necessary; and in Holland these milk-houses are fitted up with much taste. They are placed in a remote corner of the building, least exposed to the sun, the heat of the fire, or breath of the cattle. The whole building being of considerable dimensions is well ventilated; the milk-house is inclosed with a partition, and generally paved with blue marble, and fitted up with marble slabs, on which the milk is placed. Some of the milk-houses are rather more homely, being paved with brick; but the whole of them I saw are kept remarkably clean.

The dairy implements are not much different from those used in Scotland. The coolers, into which the milk is placed till it cast up the cream, are made of well-glazed earthen bowls and wooden dishes, and some of the latter are painted on the outside with lead and oil. The dish used in pressing off the whey from the curd is larger and more clumsy than that used in Scotland. The cheesevats, when the cheeses are made flat as in Britain, are made similar to those used here; but where the cheeses are formed round, the vat is just a hollow in the end of a piece

of wood, resembling a cart-nave, and is rounded at the bottom like an egg-cup. The pressing is performed by a lever, or piece of plank, the one end of which is placed under one of the beams or frame-work of the building, and a weight laid on the other end. When the cheeses are small, two, and often four, of them are placed under one lever, small blocks of wood being placed over the sinkers of the vats, so as the pressure of the lever may fall equally on all the cheeses. Brass pails are used to carry the milk from the field, where it is drawn from the cows, to the dairy, and to convey sweet-milk from the country into the cities and towns for sale. These pails are kept remarkably clean, but wooden ones, I should conceive, would be safer.

The cow-byre is paved with hard bricks, or "clinkers," as they are termed, set on edge; and the stakes to which the cows are bound, are made to be removed in summer, when the cattle are turned out to pasture. A passage before the cow's head is convenient for giving them their meat, and a trough of clean water is placed before the cows, from which they can drink at pleasure. The water is let off once a-day by means of a plug, and a new supply from the well pumped into the trough. Another passage behind the cows serves to remove their dung.

The floor of the kitchen generally consists of marble; the rest of the building is of brick. The gin-course is laid with sand, and is covered with boards when the horse is not in yoke. The whole building is roofed with tyle, and the roof rises in a somewhat conical form. The walls are generally built of brick, but sometimes of mud or boards; but the roof is supported on frames of wood, round which the walls form only a covering.

There is no urine-tank as in Belgium. Indeed, little attention seems to be paid to manure in Holland, probably on account of the soil being naturally rich.

The cows in Holland resemble the Durham short-horned breed, or the strong cows in the counties of Fife and Angus, more than the Scots dairy-breed or Ayrshires. The Dutch cows have long legs, strong bone, and rather large heads, with horns of a moderate size. Their fore-quarters are heavy in proportion to the hind. They are narrow for their size over the hook-bones, thin in the hips, light-bellied, with thick skins, and hard hair, which feels coarse. They are mostly of a black colour,

with patches and spots of white, and a few are brown, where others are black. I saw at Haite Lust, near Haarlem, the seat of Mr Van Dervolet of Amsterdam, a stock of ten cows that were all black in the head, neck, fore and hind quarters, and the trunk of the body white. One cow in that herd was of a brown colour where the others were black, but, like them, had a white trunk.

Some of the Dutch cows approach nearly in shape to the dairy breed in Scotland, being lighter in the forequarters, and more capacious about the hook bones and flanks. But even these have strong bone, thick skins, and a hard pile of hair. The whole cattle in Holland seem to be of the same breed, resembling each other in shape, colour, and size; though, as in most breeds, some may, from accidental circumstances, vary a little from the common characteristics.

From the abundant and tolerably rich pasture in every part of Holland, it might have been expected that the breed of cows would have had the best shapes and qualities, and yielded much milk. But although the herbage of the meadows is abundant, the treatment of the cows is not well calculated to bring them to all the perfection for the dairy of which that species of stock are susceptible. Nor could I perceive that the Dutch boors are at much pains to improve their cattle by careful and skilful crossing. Scarcely any of them keep a bull, but trust to those who lead them about daily to serve cows. The drivers of these bulls, in marching them round the farm-houses, intimate their arrival by blowing a horn, and wait a few minutes to see if the services of their ward are required. So far as I could perceive of these itinerant bulls, they were unsuited to bring a dairy breed to perfection. All that the boors seemed to wish was to have their cows brought into calf.

Neither does the treatment which the Dutch cows receive seem well calculated to give them superior dairy qualities. For although the meadows afford the cows a full bite, which suits a dairy stock, yet the dampness of these meadows renders the herbage coarse, and not so sweet and succulent as it would be, if the soil were properly relieved of moisture. It is also unfavourable for the cows to be turned out to browse on the meadows without any shelter from the weather except sometimes a cloth.

laid over their backs. They never enter a house till about Martinmas, when they are again shut up in the byres, and they are not loosened from the stakes till the grass can again support them. Being fed all winter and spring on dry hay of inferior quality, without turnips, or any other species of green food to keep their bodies in a milking habit, they cannot give much milk till they come into better condition. Dairy-cows, in order to render them productive of milk, must be fed at all times on succulent food.

The ample supply of the Dutch pasture has a tendency to increase the size of the cows more than to give them dairy qualities; and the want of green food in winter and spring has the same effect. The oil-cake which they get in winter increase their size, but it is not productive of milk. Even the hay on which the Dutch cows are fed during half of the year is not only coarse, from the dampness of the soil on which it grows, but it is not so well managed as hay ought to be. That of last year's growth, which I saw, had been too much exposed to the rain to be either palatable or nutritive. It had lost its green colour, and become brown and musty; and the hay of the present year, then making, was treated in a very careless manner. Much of it had been exposed to the sun till it was withered on the upper side, and that in the under side of the swath, on the damp ground, was wet and yellow. Even where the swathes had been turned over, the hay was not put into small cocks, but left exposed to the weather. This mode of hay-making gave me a worse opinion of the industry of the Dutch boors than any other part of their conduct that fell under my observation. They seem to be more industrious in domestic than in out-door matters. They employ Germans to cut the hay, and from all appearance, it would be proper for them to employ these people to dry and secure it too.

But although neither the breed of cows in Holland, nor the manner in which they are fed, seem calculated to render them very productive of milk, in proportion to their size, and the full supply of food they enjoy, yet many of these cows yield larger quantities of milk during summer than their coarse aspects would indicate. I saw many of them milked in various parts of the country, and found that many of them, when in the best

ondition, yielded from eleven to twelve quarts of milk twice very day. Some gave still more; though many came short of hat return. Where the cows were supplied with grains from he distilleries, they gave still a greater quantity of milk. That ort of food is, in summer, placed in troughs on the corner of he meadows, so that the cows can regale themselves with the regs or the grass as best suits their taste. Many of the cattle hat are fed in that way are fattened for the butcher; but some f them were giving milk, and the rich feeding rendered them roductive.

The greatest number of the Dutch cows weigh, when modeately fat, from 550 to 700 pound Dutch weight; many from 00 lb. to 900 lb.; and Mr Chappellen of Buckles Dyke, near lotterdam, assured me that he had often fed cows to the weight f 1100 pounds Dutch. The price of cows rises and falls according o circumstances; but the medium price may be taken from 80 o 95 guilders, of 1s. 8d. each; and some of the best cows, when ear the calving, or when fat, will sell at from 100 to 120 uilders, or even more; that is, from L. 8 to L. 10 each in English money.

From the minute division of land in Holland, few of the oors have large dairies, probably the greatest number of them ave only from seven to ten cows in milk at one time. Some ave twenty or more. Peter Vander at Oostenham, between Dort and Rotterdam, generally keeps about forty cows. Some oors about Leyden have upwards of fifty each; and Mr Rokes chryvers at Strunske Woorp, generally keeps about seventy ilch cows.

The milk of the cow is applied in Holland to similar purposes, and much in the same way in which it is used in Scotand. Part of it is consumed in rearing and fattening calves. considerable portion of it is used as food, either as it comes om the cow, or in cookery. Much of it, or its cream, is applied to the making of butter. But the greatest part of the ilk is manufactured into different kinds of cheese.

The rearing and feeding of calves is conducted in Holland early in the same way as in Scotland. Calves to be reared for ows, are fed on the milk of their dam for seven or eight days, fter which they get a portion of new milk, some oil-cake, skim-

milk, butter-milk, or whey, till they can support themselves on pasture. But when calves are reared for milch-cows, they ought to be fed on new milk alone, for five weeks at least, and to get some milk, with a mixture of other food, for two or three weeks more, or till they can be turned out to pasture. It is a great advantage for a milch-cow to be reared when young on milk, and to get food of a succulent and nourishing nature at all times, whether she is giving milk or is dry.

As my inquiries were made in Holland, during the summer, when few calves are dropped or fed, I had not much opportunity of seeing the feeding of calves for veal. Mr Chappellen, formerly mentioned, showed me ten calves he had feeding, in different stages of their fattening. They were kept in the dark, in wooden pens, each calf by itself, with room to rise up or lie down at pleasure, but not to take exercise. They were not suckled, but fed by the hand, on new milk chiefly, till they were ready for the shambles, at from six weeks to ten weeks old. From this specimen, and the veal I saw in the market, and at table, it appeared to me that the Dutch calves are reared to a considerable size; that their flesh is very pure and white, but not nearly so fat as the veal sold in the Glasgow and Edinburgh markets. Neither is beef, though thick and fleshy, nearly so fat as that sold in the Scots and English markets. These circumstances indicate an inaptitude to fatten in the Dutch cattle.

Some excellent rules are, I understand, observed in Holland: they kill no calves till they are fed two or three weeks; and the first week's milk, after a cow has calved, is neither eaten, nor made into cheese or butter, but given to the calves, from an apprehension that a new calved cow's milk is not only loathsome, but unwholesome. This rule is worthy of adoption everywhere, especially when milk can be turned to good account, in feeding calves for veal.

Milk is used in its natural state, to a considerable extent, in Holland. Besides, a great number of cows, that are kept in or near to the great towns and cities, there are vast quantities of new milk carried into every one of them, which find a ready market among the town's people. The meadows around Amsterdam, Rotterdam, and many other towns, are so stocked

with cattle, that they resemble more a market than pasture fields. Many of these are fattening, but a great number of them are in milk. The milk is carried into the towns in brass pails, sometimes on carts drawn by dogs; and, still more, in boats, on the canals, brought from a considerable distance. The milk is sold to dealers, who retail it to the citizens; and inspectors are appointed by authority, with apparatus, to try the quality of the milk, and who have power to seize that which is not of proper quality.

The greater consumption of new milk in Holland, than is commonly used in Scotland, shews the good sense of the Dutch people. Milk is one of the most wholesome and nutritious species of food, especially fresh from the cow. It would be an improvement in the condition of the inhabitants of Britain, if they could be induced to use more new milk, and less tea.

The making of butter is no where better understood, or conducted with greater propriety, than in the Dutch provinces, and particularly in Friesland, where great quantities of excellent butter are made, much of which is sent to the London market. Large quantities of the best butter, perhaps, in the world, are brought every week to the market at Leewaerden, the capital of the province of Friesland, and to Sneeck, a market-town in that department, where seven or eight thousand firkins, of 80 pounds each, may sometimes be seen offered for sale on one market-day, most of which is bought up for the London market. There are seven or eight ships constantly employed in conveying butter from Harlingen to England. Much fine butter is also made to the south of Rotterdam, towards Belgium. There is no part of Britain, or probably in the world, where butter is of a richer quality, or a finer taste, and more free from impurities, than that made in Holland.

The superior quality of the Dutch butter may probably proceed, in part at least, from the soil and climate, and partly from the breed of cows; but, most of all, from the careful and cleanly manner in which all the operations of the dairy, regarding butter in particular, are conducted in that country. The soil, in all parts of Holland, is favourable to the growth of meadow-grasses. And though much of the soil is too damp, yet it is rich; and being impregnated with a portion of salt, with which

the herbage is also tinged, the cows can eat a large quantity of the salted herbage with impunity, and which, no doubt, enriches the quality of the milk. The climate, too, is favourable to the growth and health of cows. It has been found from experience, that, when cows are fed on good natural herbage, the butter is richer, and has a finer flavour, than when the same cows are fed on clover, turnips, and artificial grasses. The cows in Holland give a great quantity of butter in proportion to the quantity of milk. The cows of the improved dairy breed, in this country, that are fed on artificial herbage, give more milk, and less butter, than the same do when cows are fed on natural pastures. All cows that are in good condition always give richer milk than the same cows will when they are lean.

But the superior quality of the Dutch butter proceeds more from the cleanly and careful manner in which it is manufactured, than from any other cause. The milk, when drawn from the cows, if butter is to be made, is poured out into earthen ware, or wooden dishes, to cool, in a well aired milk-house, for twelve, eighteen, or twenty-four hours. The cream is either floated over the sides of the coolers, or taken off with a skimming dish, and stored in a jar, till as much is collected as may be convenient to be churned at one time. And to prevent decomposition of the cream, it is stirred about once or twice every day, with a wooden spattle.

The cream is churned in an upright churn, the staff of which is moved by a gin, turned by a horse. Two hours are generally allowed for the churning process. When the cream is too cold, it is warmed by throwing some hot water into the churn, to bring the cream to about 70 or 75 degrees of temperature of Fahrenheit's scale.

The butter, when taken out of the churn, is placed in cold water, and the milk is carefully washed out of it, by kneading it with the hand or skimming-dish, in renewed changes of water. The butter is then salted with the finest salt, which requires to be minutely mixed with the butter. In some dairies, the salted butter is immediately packed into firkins; but, in others, it is allowed to remain in an open tub, for several days, and often turned over before it is put into the firkins. The propriety of such delay in packing the butter into the casks may well be

doubted; for the more that either milk, cream, or butter, are exposed to atmospheric air, they will the more readily become sour and rancid.

In some of the dairies about Rotterdam or the Hague, the new milk is poured into brass pails, of considerable size, which are set in cold water, in order to extract the natural heat rapidly from the milk, before it is placed in coolers, in the milk-house, to cast up the cream. This, however, is not the general practice in Holland, though it is desirable to have the new milk cooled as soon as possible after it is drawn from the cows; yet the turning it over from one dish to another injures the milk, and exposes it too much to the air; and it will probably cool as soon in the earthern or wooden coolers, in which the milk is only about three inches deep, as it can do in larger brass pails, placed in cold water.

The quality of butter is considerably affected, by the period of time allowed for the cream to rise, before it is taken off the milk. The cream that comes first to the surface is always thicker, and the butter from it richer, and of better flavour, than that which is made from the cream that is longest in rising to the surface of the milk. The reason of this is obvious. The fattest portion of the milk will always come first to the surface; and the longer the cream is allowed to remain on the milk, the less fatty portion will diminish the average quality of the whole by admixture, and permit the injurious action of the atmospheric air.

In some of the dairies in Holland, I found that the cream was taken off the milk in twelve hours after being placed in the coolers, and that none of it was allowed to remain more than twenty-four hours. But, in Scotland, where butter and skim-milk cheese are made, the cream is generally allowed to remain from thirty-six to forty-eight hours on the milk, a length of time which must render the cream of inferior quality. Nothing is so delicate in its nature as milk or cream.

To the southward of Rotterdam, and in the Belgic provinces, the whole milk and cream are churned together; but I do not think that the milk had been so well preserved and prepared for churning as it is in the vicinity of Glasgow, where the whole milk is generally churned. The Belgians, like some people in

Britain, imagine that the butter must be of inferior quality when the milk and cream are churned together; but this is certainly an erroneous opinion. When that is practised in the dairy district of Scotland, the milk, when cool, is placed in a jar, and exposed as little to the air as possible, till it has become clotted. The butter is no way injured, by the milk being churned in mass. The whole fresh butter sold in Glasgow is churned from milk and cream together; and better butter is no where to be found.

Where the whole milk is churned in Holland, part of the butter-milk is used as food by the boors and their servants; part of it is bought by the inhabitants of that densely peopled country; and what remains is given to the cows, mixed into their boiled meat. Some people give part of it to the pigs, and others form it into cheese, along with a portion of unchurned milk.

I cannot refrain from repeating my admiration of the very cleanly manner in which every operation of the dairy is conducted in Holland. Milk, it has been already observed, is very easily contaminated by the least degree of nastiness, or even by the atmospheric air. But of all the people on the face of the earth, the Dutch are the most attentive to cleanliness in the management of their dairies, and indeed in their whole domestic economy. Their milk-houses, and every dish and implement belonging to them, are kept as clean as the china or crystal used at table in this country; so that to their superior attention to cleanliness, the good quality of their butter may, in a great degree, be attributed. If so, it holds out great encouragement to all other people to follow their example in this respect.

The making of cheese is not so well understood in Holland as the making of butter, though cheese is also a staple article of produce in that country. Many of the occupiers of land are much engaged in making cheese. The cows being the principal stock of the Dutch farmers, they are at much pains to render their produce efficient; but they certainly have not yet learned how to make cheese of the fine quality that is made in Britain. They make, and send to the markets of Europe and America, immense quantities of different kinds of cheese, and from which they derive much gain; but none of it is so correct-

ly manufactured as the butter which they make, though the defect cannot arise from the want of cleanliness in the cheese-husbandry.

To describe minutely every different mode pursued of making cheese by the dairy boors of Holland, or every diversity in the quality of their cheese, would be an endless task, and beyond the power of one who had only spent a few weeks in that country. But having devoted much of that time to the inspection of these dairies,—seen thousands of their cheeses in the stores of the cheesemongers in several towns and cities, and who frankly gave me every information in regard to them which I desired,—I obtained from them letters to their agents, who purchase cheese for them in the country, and a general introduction, in the Dutch language, from Alexander Ferrier, Esquire, British Consul at Rotterdam, requesting all and sundry to give me such information as I wanted. With these, and an interpreter when required, and directed and assisted by the cheese agents, I travelled many miles, in all directions, among the Dutch farmers. I had thus opportunities of seeing every operation of dairy husbandry often performed by the industrious boors and their virtuous *Vrows*. It is only incumbent on me to state concisely every thing that seems necessary to be related or attended to in the cheese husbandry of Holland, and to offer such remarks as may occur to me on the process.

In the southern parts of Holland, about Dort, the making of proper cheese is little attended to; but a sort of imperfect cheese is very much in use. This is a soft cheese, composed of skim-milk and butter-milk, put together and formed into a curd, to be eaten with bread, and spread over it with a knife. Some of it is partially pressed into cakes, of about an inch and a half thick, and nine inches square, which are eaten after dinner, or at lunch. This sort of cheese is always clean, and free of any disagreeable flavour; but it is poor, and tough, and has an insipid taste. It is, however, economical, as soft cheese goes farther when eaten with bread than the same quantity of milk formed into hard dry cheese would do.

Sweet-milk cheese is made about Gouda, fifteen miles north from Rotterdam, and also in the vicinity of Edam, and about Purmerent, in North Holland. The boors in these districts

make this species of cheese, so far superior to the ordinary cheese in Holland, that all the sweet-milk cheese in that country gets the name of "Gouda" or "Edam" cheese, wherever it is made; in the same manner that all the rich cheese in Scotland is called Dunlop cheese.

Having carefully inspected many dairies through nearly all North Holland, and between the great branches of the Rhine, from Alblasser-Waert to near Betuwe, east of Rotterdam, I shall detail the *modus operandi*, which I found to be nearly the same in all these districts.

The common mode of making sweet-milk cheese in Holland, is to coagulate the milk in its natural heat. Some who have few cows, set aside one meal, and coagulate a whole day's milk at once. But as the cheeses are mostly small, to save the trouble of heating the milk, the most common way is to set the curd every time the cows are milked, and in the natural heat of the milk.

But as milk requires to be coagulated as nearly as possible to animal heat, or never under 90° of Fahrenheit's scale,—as the Dutch cows are milked in the field, frequently at a distance from the farm-house,—and as the milk has to be turned over from one dish into another, at least twice, and to stand till the whole cows on that farm are milked, it must cool considerably before the curd can be formed.

To remedy this evil, a small quantity of hot water is, by some, thrown into the milk, when the rennet, or coagulating substance, is applied, in order to restore the heat that has been lost. This seems to me a very necessary course of proceeding, especially when the weather is rather cold. Many of the boors, however, do not apply hot water at that stage of the process, but coagulate their milk when it is many degrees below animal heat. When the curd is formed, they break it small, by taking it up in a large wooden plate, and letting it run over the edge of the dish, one quantity after another, till the whole curd is broken small. They next take off about the half of the whey from the curds, then throw in a considerable quantity of boiling water, and break the curds minutely; and when the curds have fallen to the bottom of the tub, they draw off the water and remaining part of the whey. After the whey is nearly removed, but while

the curd is still soft, a man makes his arms bare, washes his hands, and taking up one quantity of curd after another, as much each time as he can grasp in both his hands, he squeezes the curds through his fingers, till he makes the whole mass of curd as soft and small as possible; he then packs it into the cheese-vats, pressing it down with his hands, and turning the curd out repeatedly till it adheres, when one of the females puts a thin cloth round the curd, and places it under the pressure of the lever.

The apparatus for pressing cheese in Holland has been already described. The lever is made to operate on four cheeses at one time, by placing blocks of wood on the sinkers of the cheese-vats. But, when the cheeses are large, only one, or at most two, of them can be well pressed by one lever at the same time. After the cheeses have been under pressure, in some dairies, three or four hours, and in others about twelve, they are turned out of the vats, and after the upper side is pared round of the superfluous curd, the cheese is replaced in an inverted position under pressure. The cheeses are re-inverted in the vats a few times chiefly for the purpose of forming them as round as cannon-shot. The flat cheeses are pressed in the same manner as is done in Scotland.

Cheeses in Holland are salted either by rubbing dry salt on their surface, and turning them over daily for eight days with small cheeses, and for fourteen with large; or they are placed to half their thickness in brine, made as strong as to swim an egg, and turned in it daily. After being salted, the cheeses are laid on shelves, to dry for a few days, and then put into fresh-water for some hours; and, after being dried with a cloth, they are rubbed over with the milk of a new calved cow, whey, butter, or other greasy substance, which is overlaid with a thin coat of linseed oil, in order to exclude the air, and prevent cracks in the skin. When kept long in the store-houses, the cheeses are turned over, any mouldings scraped off, and more grease rubbed on to keep them mellow on the surface. I never understood that any grease is rubbed on Scots cheeses, or that their skin cracked for want of greasing.

Some of the cheeses in Holland are painted on the outside of a particular colour. After the cheeses have been partially dried,

and scraped, a coat of colouring matter is put on with a brush; and, after it has dried, a second coat is applied. They are varnished with boiled linseed-oil over the paint. The paint used in colouring the Dutch cheeses is obtained from coarse linen-bags, in which grapes had been pressed, or from cloth that had been dyed a brown colour, by an infusion of the juice of a species of sun-flower, which is brought from France and Italy. These rags cost the Dutch boors about two shillings per pound. The colouring juice is extracted from the rags by infusing them in three different changes of water, and squeezing out the colour.

It may be necessary to put greasy matter on the surface of cheeses that are poor or too much dried; but to paint them a mahogany colour on the outside can only arise from the strong desire of the Dutch to impose upon any thing an appearance of art. The arnotta put into some kinds of cheeses in Scotland and England to colour them, though harmless, can only be considered a fanciful conceit. But the Dutch mode of painting cheeses must exclude the air too much from them, and prevent the sweating which cheeses generally undergo in warm countries, and which saves them from putridity. Surely no one can relish the juice of dirty rags, or the oil-paint which covers that juice. Every milkmaid knows when cheese or butter is naturally of a yellowish colour, it is evidence of their richness; while paleness of colour is considered a proof of poverty. This knowledge might induce some to imitate the natural rich tinge of colour, as a deception upon the unwary; but people must be easily deceived indeed, if they take paint on the outside of a cheese as a proof of its internal good quality.

Dutch cheeses vary much in size. Many of them are not more than four pounds; though some are eight pounds, and others about a stone in weight, mostly of a round shape; but many of them are also made of a flat form, of different sizes, generally much heavier than those which are completely round.

Skim-milk cheeses are also made in considerable quantities in Holland. In the province of Friesland, and in other parts where butter is the chief article of manufacture, a very inferior species of cheese is made of the skim-milk. The greatest proportion of this kind of cheese is made while the skim-milk is

sweet; but many of the boors allow it to become sour before it is made into cheese, and others coagulate the butter-milk with the skim-milk, and make both together into cheese.

The mode of making skim-milk cheese is nearly the same as that of the sweet-milk, as described above. The skim-milk, however, requires to be heated before the rennet is applied; but, after the curd is formed, all the other operations of breaking the curd, removing the whey, forming, pressing, and salting the cheese, are conducted in the same manner. In some dairies, skim-milk cheeses, as soon as they are formed, and before they are fully pressed, are placed for an hour or more in warm water, in order to make them adhere, and to deprive them of any whey still in the curd. Some follow this plan with all kinds of cheese, though the practice does not seem to be general; and when the milk has either been at a proper temperature when coagulated, or the curd broken in hot water before the half of the whey has been removed, the hot-bath process does not appear to be necessary. I was informed that some of the dairy boors salt the skim-milk cheeses when in curd; and that others endeavour to improve the flavour of the cheese by macerating and cutting cloves into small pieces, and mixing them with the curd; but none of these practices were much followed.

The whey which is drained from the curd in Holland is put into casks for a week or more, to cast up cream. The cream is skimmed off daily, and when a sufficient quantity of it is collected, it is churned, and the butter (such as it is) is either eaten by the farmers, or sold at such prices as can be obtained for it. After the whey has ceased to cast up cream, it is applied to the feeding of pigs.

I shall now offer a few remarks on the Dairy Husbandry of Holland.

Dutch cheese of every kind is always clean; but much of it is poor, tough, dry, and hard, compared to English or Scots cheese; and as these are evident defects, it may be proper to inquire from what causes they proceed, so as they may be remedied or avoided.

As the milk in Holland is as rich, and probably richer, than that in our Scots dairy district, the defects in the Dutch cheese

must proceed from want of skill, or inattention in the manufacture. When cheese is made of skim-milk, and sold as such, its poverty cannot be complained of; but when the cream is not removed, and the cheese is sold for a sweet-milk one, it ought to be rich, if justice is done to it in every respect. I should be sorry to insinuate that the Dutch boors extract any of the cream from the sweet-milk; but I have no hesitation in stating that they injure their cheese very much by unskilful treatment. If milk is either too cold or too hot when it is coagulated, a portion of the fat will in either case come off with the whey more probably than when the curd is formed at the proper degree of temperature.

If the milk be too cold when it is formed into curd, the breaking of the curd so much at first makes part of the butyraceous matter in it come off with the whey, as is evident from the whey being of too white a colour. The next operation of breaking the curd small among hot water produces a similar effect in bringing off another portion of the oily matter; and when the curd is again squeezed through the man's fingers, and made small and soft, a very considerable portion of the butyraceous matter is thereby wrung out of the curd, and of course lost to the cheese. I observed, when the man was squeezing the curd through his fingers, that he expelled a considerable portion of whey, as white as milk, and nearly as fat as cream. This was nothing else than a portion of the oily matter, wrung out of the cheese by the forcible labour of the man's hands.

Now the milk ought, in summer, to be coagulated at 90 degrees, and at a still higher temperature in cold weather. The curd ought never to be harshly broken, but merely cut with a long knife, or piece of thin wood shaped like a sword. It should be softly handled till the greatest part of the whey is drawn off, and the curd somewhat hardened. It should next be placed in a strainer, and a small weight placed on it for a few minutes, and then the curd should be cut into slices, and the weight replaced. This weight should be continued for twenty minutes, or half an hour, till the whey is all extracted. The curd should then be minced small, with the knife now used in every Scots dairy; the salt should be mixed with the curd, and the cheese put under pressure. When this plan is followed, the whey

comes off nearly of the colour of sea-water, no one could extract butter from it, and the cheese would not be impoverished.

The hardness and dryness of Dutch cheese proceed partly from the curd being too much heated at some period of the operation, and partly from over salting. Breaking the curd in hot water, and squeezing it too much, makes the cheese tough; and if the milk is sour before it is coagulated, or if butter-milk is mixed with it, the cheese cannot fail to be tough, hard, and dry.

Another defect in some of the Dutch cheeses is, that they swell and become spongy like loaf-bread. The same defect may be observed in some of the Scots cheeses, but in a slighter degree to those of Holland, or even of England. It probably proceeds from the milk undergoing a slight degree of decomposition before it is coagulated, as it abounds more in skim-milk than in sweet-milk cheese. The long standing of the milk in the coolers to cast up cream may superinduce a tendency in the milk to decomposition. In the Dutch cheese in particular it may partly proceed from the milk being drawn from the cows at a distance from the farm-house, and much exposed to the sun; or the excessive breaking of the curd may introduce too much of the atmospheric air into it *.

It is one of the greatest errors in the dairy husbandry of Holland to allow so much of the butyraceous matter to be sent off with the whey; and although pigs may live on sour whey, it indicates great mismanagement to keep the whey fermenting in barrels till it is transformed into a kind of vinegar, before it is given to them. New whey has often been given to horses and cows in Scotland, and it is found to promote their fattening, and to make the cows even productive of milk. But by much the most profitable use to which it can be applied is the rearing and fattening of swine. It has been well ascertained, that the whey from the milk of three cows in one season will, with very little other food, fatten a pig, that may be purchased for ten shillings, to the weight of from fourteen to sixteen stones, provided the whey is given to it new and unfermented. But when it has not only been soured, but fermented for a week or longer before it is given to swine, it is not of much value as food.

* We have heard it stated by expert cheese-makers, and can confirm the statement by our own experience, that too much rennet will swell all kinds of cheese.—Editor.

ON ORCHARDS AROUND FARM-HOUSES. *By Mr* MAIN, *Chelsea.*

A FEW observations on a subject of rural economy, which is in many places wholly neglected, may not be uninteresting. The traveller through many parts of the north of England and south of Scotland, cannot avoid being struck with the want of orchards around the farm-homesteads. Over all the south of England, an orchard of from one to four or six acres is an indispensable appendage to a farm; and, in the neighbourhood of large towns, no portion of the farm pays the tenant better. It is true, that in a country where fruit-puddings and pies are not necessaries of life, or where cider or perry is not relished, the cultivation of orchard-fruit is not indispensably requisite. Still if there be a market for the fruit within a distance of twenty miles, the farmer will always find it his advantage to have a load to dispose of, when he may be in want of a little money to pay his harvest people.

If a piece of good ground were entirely occupied with fruit-trees, and the tenants' sole dependence were upon their crop, not only would much variety of fruit be required, but incessant attention would have to be paid, and great anxiety would be felt, lest his crops miscarried; because fruit, even in the most favourable situations, is but a precarious source of income. But to a farmer who depends on his corn and cattle, an orchard, so far from being an encroachment on either arable or pasture land, would be one of the most convenient enclosures about the homestead. For a cow about to calve, for weaning or weaned calves, for young or weakly lambs requiring attention, or as a piece of pasture for any purpose at all times, such an enclosure is most useful.

Independently of pleasure and profit, an orchard has other especial advantages in a bare country, namely, those of shelter and ornament, for nothing gives a higher degree of apparent security and comfort than a farm-house half embraced by thriving and fruitful trees.

For these obvious reasons, it is expedient that every farm should have some portion of orchard-ground attached to it. Every landlord should encourage and assist his tenants to plant

them, where there is yet nothing of the kind. It is an improvement which bestows benefits on both landlord and tenant. To those who may have such improvement in contemplation, the following observations may be of service.

The most convenient and guarded place for a farm-orchard is immediately behind the house, so that the back-kitchen door may open into it. It matters not whether it be on the north or any other side of the buildings. Many think that an orchard should be in a low sheltered spot, but this is a serious mistake. Fruit-trees do best on a moderately high and open situation. Shelter from wind is certainly necessary, but this protection must be obtained otherwise than by planting in a dell.

A deep mellow loam is most suitable for an orchard. It does not require to be richly manured, provided it is fresh, unexhausted, and sufficiently dry. Whether the subsoil be gravel or stone, so as such beds lie not too near the surface, it will be no detriment to the trees; but if of a tenacious clay which is retentive of moisture, then draining must be resorted to, to free the soil from superfluous moisture. This must be done effectually, otherwise the defect will ever after be regretted by the planter. A sloping surface is better for all plants than a dead level, not because a heavy or long continued rain or melted snow runs the sooner off such a position, but because that portion of it which sinks into the ground gradually passes downward in an under current, leaving no portion of it to stagnate in any one place, so as to be prejudicial to the roots.

There are different kinds of orchards, most generally of apples, as being, on the whole, the most valuable of British fruits. Sometimes there is a mixture of pears, rarely all of pears, except in those places where perry is the common drink of the farmer and his labourers. Sometimes we meet with orchards of Heart-cherries only, which, when near towns, pay well. In some counties there are extensive orchards of Kentish cherries, the soil being a light, sandy, and dry loam, particularly suitable to this variety of fruit. In other places we find the common black or Caroun kinds preferred to all others, as being not only richer in quality, but the most certain bearers, and consequently most profitable to the farmer; considerable quantities of them (or their juice) being annually exported to Spain and Portugal, for

the purpose, it is said, of colouring wine. This sort of cherry-tree grows to a stately size, and yields valuable timber. Some orchards of this kind, of five or six acres, pay an annual profit of L. 100, the fruit being gathered and sent to market at the expense of the purchaser, independently of the value of the ground as a pasture.

But the most profitable kind of orchard is that which contains all kinds of hardy fruit-trees and bushes, and where the land is solely appropriated to that purpose. This kind resembles gardening more than farming, and is therefore unsuitable to large farms, but quite applicable to small ones, to which an acre of orchard, requiring no horse-labour, would be of essential benefit. In such half-standard apple-trees are planted in rows 18 feet from each other, the trees being 12 feet apart. In the same line with the apple-trees are planted either gooseberry or currant-bushes, or, what pays sometimes equally well, filberts. The latter are not allowed to rise higher than about 4 feet, and kept spurred in, exactly like the white currant. Gooseberries gathered green for tarts, pay the farmer better than when ripe, and are not nearly so troublesome in the carriage to market. As such an orchard is not to be grazed, 2 feet of the soil on each side of the rows of trees is kept bare, and always free from weeds. On this a mulching of rotten dung may he laid every winter, and raked off in the spring, upon the intermediate strips of ground to be planted with potatoes, or sown with onions, turnips, scarlet-runners, or any other crop which the cultivator can most advantageously dispose of in his neighbourhood.

For such an orchard the earliest and surest bearing apples should be preferred. The greatest majority should consist of the Hawthornden, the rest of the French Crab and Scarlet Nonpareil. A few of the earliest pears may be intermixed, as the Petit Muscat, as a kind which fetches a good price on its first appearance in the market. The most hardy and profitable kind of plum for a farm-orchard is the common Damson, it being always in request for baking, preserving, or for wine making.

In preparing the ground for an orchard, different methods are followed. When the spot is fixed on, the fence (if it requires one), should be first executed. This is best done by a

well planted Whitethorn hedge and ditch. The latter should be on the outside, and not less than three or four feet deep, to allow a bank of corresponding height. Young plants of the English Elm should be planted with the thorns for a hedge-row screen to shelter the fruit-trees, except towards the southern exposure. The elms may be put in at six or eight feet distances; and as they bear lopping, they may be kept trimmed up to form, together with the hedge, a lofty narrow protection against wind.

The next thing to be considered is, whether the ground is sufficiently dry. If not, rubble drains should be made across the slope (if there be any declivity) into the lowest outside ditch.

The ground may be prepared for receiving the trees either by trenching it wholly with the spade fifteen inches deep, or with the trenching plough. This trenching is particularly necessary when the orchard is not intended to be a meadow or pasture. If the soil be thin, it may be ploughed into ridges six yards wide, twice gathered, which will give a sufficient depth of mould on the ridges to receive the trees. Another way is to trench beds eight feet wide for the trees, and prepare the rest of the ground with the plough and harrows, to be sown down with grass seeds and a single cast of a dwarf growing oat, in the month of March after the trees are planted. There is still a cheaper way of planting an orchard on land which is already in turf, viz. digging or trenching pits six feet square for the trees. This is done by first taking off the turf, to be relaid when the tree is planted, stirring the soil in the pits eighteen inches deep, and adding, if necessary, a barrowful or two of maiden earth, mixed with a little rotten dung, to place the tree in. This plan may be pursued when the soil is of sufficient depth on a gravelly subsoil; but if on a clay subsoil it is the worst way possible; because these pits become receptacles of stagnant water in wet seasons, and are of course injurious to the roots of the trees.

Whichever mode of planting is determined on, the openings should in the first place be made ready for the trees, which should be had from the nearest nurseryman, carefully taken up

and as carefully planted. If the roots are broken or bruised they should be smoothly cut back, and the shoots of the head pruned into about one-third of their length, in the month of April after the trees are planted.

For a farmer's orchard which is also intended for a penn or pasture, the trees must be all standards, with stems six feet high. This precaution is absolutely necessary where cattle are permitted to range. They should be grafted on free stocks and true of their kinds. The sorts of apples before mentioned may be chosen, of cherries the Caroun, of plums the Damson, should be the principal. Any favourite sort of pear or other fruit may be added for the sake of variety. But there is a safe rule for the choice of fruit-trees, viz. to prefer the kinds that *succeed best in the neighbourhood*; for it is certainly true that some sorts of fruits are affected by one description of soil and local climate more than others. This circumstance deserves attention.

Trees planted in rows at twelve feet apart from each other and eighteen feet intervals between the rows, may be supposed to stand too thick; but as they will bear a good deal of fruit before they interfere injuriously, the underlings may be pruned away without regret when this takes place. The whole should be placed in quincunx order, as the one affording most air and light to each individual. It is almost unnecessary to add, that every tree should be securely staked up to keep them steady against wind, and be carefully cradled or bushed before any kind of cattle are admitted into the orchard. An acre of orchard planted at the above mentioned distances, would require above 220 trees.

ON REAPING WITH THE SCYTHE.

It is certainly a remarkable circumstance in the history of mechanical science in this country, that the art of cutting down the cultivated crops should be so inadequately supplied with instruments. The tools which are employed in every other art evidently display an ingenious adaptation of means to an end. Not so the reaping-hook. Unlike every other mechanical instrument, it is the physical power and dexterity of the labourer alone

which constitute the efficacy of the reaping-hook. Its extremely simple form cannot alone have prevented the invention of a substitute. The knife and the spade are as simple in form as it; and yet the former has been displaced by many mechanical contrivances to which the power of steam is applied; and the latter is insignificant, when compared to the plough moved by the power of the horse, in every operation of magnitude in the field. Like the spade, the reaping-hook may be useful in the minuter and lighter operations of the garden; but its continued use in the field is attended with immense loss of time and money. It is nevertheless an efficient implement for executing good work in the hands of the dexterous labourer; though there is no single operation in farm management which is attended with the annual outlay of so much money, and the waste of so much valuable time, and so dependent, at the same time, on adventitious aid, as the reaping of the culmiferous crops. The expense incurred at harvest-work with the reaping-hook is seldom under 12s. an acre. Judging only by the magnitude of the work, it might surely be executed by horse or steam power for a third of that sum. One hundred acres of corn costs an outlay of money to the extent of L. 60 a-year for reaping. Of this sum, L. 45 a-year is expended uselessly; and which in the course of nineteen years' duration of a lease, with the simple interest thereof, would amount to nearly L. 1000,—a sum which, if saved, would purchase many comforts for the declining years of life. We say this sum is expended uselessly, for it is generally carried off by strangers. The time, too, which the reaping alone of the corn occupies is generally three weeks,—a period much too long for the precious fruits of a twelvemonth's toils to be exposed to the vicissitudes of a variable climate.

These difficulties were long felt, without being attempted to be remedied. Attempts, however, were at last made to substitute machines driven by horses for the reaping hook. They have not yet been crowned with success, though they have no doubt laid a foundation upon which some future contriver, more ingenious than the rest, may erect a simple and usefu structure.

Simple as the reaping of corn appears to a spectator, it

is in reality a very troublesome sort of work. The cutting it down by the ground is not the only consideration which is required. All the manipulations which the corn has to undergo in future must be, and can only be, facilitated at harvest. It must be bound up into sheaves, for the conveniency of transportation. It must be exposed in small portions to the sun and wind for a time, before it can be safely preserved in large quantities; it must be carried off in small quantities at a time from the fields to a more convenient place to be preserved, and to pass again through hands in the thrashing and cleaning process, before it can be made available to the consumer. That machine must be very ingeniously constructed, indeed, which can prepare a crop of corn for all these successive but necessary manipulations.

Our surprise may therefore be a little abated at the hitherto unsuccessful attempts in the construction of reaping machines, when we consider the nature of the work which they have to perform. Though much ingenuity has been displayed in both Mr Bell's and Mr Mann's reaping-machines, they cannot, it is evident, realize all our expectations on that subject. That of Mr Bell cuts the corn so surely, that not a single straw can escape; but it does not lay the swath of corn, when cut, in a direction at right angles to the line of draught, which it must be made to do before the corn can be taken off the ground in the best and most expeditious manner to be bound into sheaves. It appears to us to require considerable power to move it; and it certainly requires more dexterity to manage its motions than the generality of ploughmen possess who have the charge of farm-horses. Mr Mann's machine lays the corn at right angles to the line of draught, and therefore more perfectly than Mr Bell's; though it is questionable, if it will be able to cut it so surely. Mr Mann's appears to be as easily moved with one horse as Mr Bell's is with two. Mr Mann's has not yet received a fair trial. Would a combination of the best parts of the two machines effect the cutting and laying down of the corn in a satisfactory manner?

But however well these may be simultaneously accomplished by the same machine, no reaping-machine can be said to approach nearly to perfection, that only reaps, and lays down

the corn when cut in a swath; but which does not collect the corn into bundles, ready to be bound into sheaves. Farther than this it is perhaps beyond the power of machinery to accomplish in this kind of work, though short of this no mechanician should rest satisfied with the capability of his reaping-machine. The making of bands, the binding of sheaves, and the setting of stooks, must be confided to manual dexterity. The locomotion necessary to a reaping-machine, when in the performance of its work, will always present an obstruction to the perfection of its construction; though many greater mechanical difficulties have already been surmounted by our ingenious artizans. An insurmountable difficulty will sometimes be found to the use of reaping-machines in the state of the growing corns. A portion of it may be standing erect, or only a little swayed, while others may be twisted and laid flat in every possible direction. High winds and heavy rains may ravel and beat down a whole crop in a single day. With the corn in that state it will be impossible to derive much assistance from the reaping-machine. Fotunately a laid crop is not of very frequent occurrence, though, to a partial extent, portions of laid corn will be found on every farm in every season. To reap three-fourths, or even one-half, of the crop with efficient reaping-machines will insure a considerable saving, though the laid portions may have to be reaped with the sickle.

Until the appearance of an efficient reaping-machine, much saving of money may be effected in reaping by the substitution of the scythe for the sickle. The scythe has long been in use in agriculture, and powerful as the implement is in the hands of the labourer, in comparison with the sickle, it is surprising it has not been more used at harvest-work in this country. It is used in France and Switzerland, in many parts of England, and in Aberdeenshire. The Hainault scythe takes up an intermediate position between the scythe and the sickle. The scythe can only be wielded by stout men, and whatever work is performed by it requires the assistance of labourers besides the mower. These circumstances have no doubt had the effect of restricting the use of the scythe. On the other hand, every boy and girl, as well as grown up person, can assist at harvest-work with the sickle. From the little work which can individually be accom-

plished with it, a considerable demand has arisen for numerous additional labourers at harvest-work. Independently of the outlay of money in paying these additional labourers, the farmer experiences great inconvenience in lodging and boarding them. Bed-clothes have to be provided, and victuals cooked daily, for scores of strangers, too many of whom are people of loose character. Common decency is outraged by the indiscriminate occupation of the same apartment by the different sexes. Few farm-offices are provided with suitable apartments for the classification of the sexes, because the effects arising from huddling together numbers of people, is a matter of less importance to many than the expense incurred in making suitable apartments, which are to be occupied only for a few weeks in the year. The straw-barn is therefore appropriated to the harvesters generally as a sleeping apartment. Under these circumstances, the period of harvest is an era in which has originated much shame and misery to many a simple and innocent mind. It is incumbent on those who are responsible for even their temporary servants, to abolish the recurrence of reprehensible scenes. It is their duty to do it, if by the doing it they can avert a pang from a single bosom.

Much of this evil may be avoided by selecting labourers of good character, but if it is impossible to discriminate the good from the bad among a host of strangers, all the evil consequences may be avoided by employing, at harvest work, only the regular servants on the farm. So long as the sickle alone is employed for reaping the crop, we are aware that the usual labourers on a farm cannot accomplish it. But independently of the consideration for morality which we have just urged, the necessity for economy ought to suggest the adoption of such means as will accomplish this desirable arrangement. In both these points of view, reaping-machines possess many advantages. Until they are presented in a manageable shape, the scythe will be found to forward the proposed arrangement as nearly as any imperfect implement can. By its use, only a very few more labourers than the usual quota which the farm supplies, will be found quite sufficient to reap the crop, and these few can be selected of industrious habits and good characters from the neighbourhood, who can easily walk to their own homes in the evening after the labours of the day.

Under present circumstances, the farmer in a manufacturing county is completely under the power of the manufacturers for the supply of labourers for the harvest. On the east coast of Scotland this difficulty has been frequently felt; the Irish labourers, wanderers as they are, never penetrate so far, and the Highland mountaineers, who "rush like a torrent down upon the vale" at the beginning of harvest, receive a momentum that cannot be arrested till they arrive at the Lothians. Thus the farmers in that district are placed in a very dependent situation. We remember in one year of manufacturing briskness in Forfarshire, that the weavers were not allowed to go to harvest. Many a field of corn stood for days uncut, till a high wind shook a great proportion of the crop. The better part of labour as well as valour is discretion. The discretion which we would exercise in harvest, would be to dispense altogether with the services of the manufacturing population, since they cannot be regularly depended on, and entirely rely on the resources of the farm and neighbouring villages, which contain agricultural labourers. Experience enables us to assure those who have never tried it, that the scythe will enable them to exercise this discretion with advantage; and it will certainly effect a considerable saving in money when compared with the sickle.

The land must be prepared by rolling for the use of the scythe. Clods and stones soon blunt and break the edge of the scythe: the roller should be heavy. All stones which are not compressed into the soil by the weight of the roller should be removed, and this is easily accomplished by mounting a box on the frame work, into which the man who drives the horses can throw the stones if they are few in number, or should they be numerous, another person can follow the roller and lift them up. The stones can be disposed of at the ends of the field. The best time to carry off these large stones is when the field is preparing for the crop which is to be rolled. Rolling the whole crop imposes, it is true, additional labour in spring; but it is absolutely necessary when the scythe is to be employed in reaping. Wheat is generally rolled at any rate after the grass-seeds are sown in it in spring, and most people prefer rolling the barley after it is sown, in order to make as smooth a surface as possible for the braird of that kind of grain, so that the additional labour

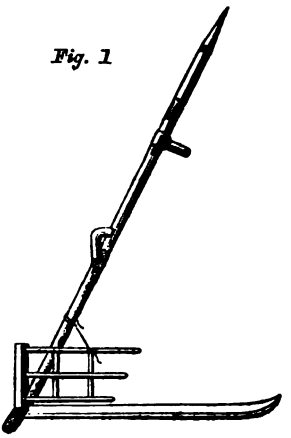
only consists in rolling the oats. It is always advantageous to roll oats early in a dry season to prevent the ground becoming too dry, for of all the culmiferous crops the oat is most affected by drought.

The scythe employed in reaping corn requires more nicety in the construction of its several parts than one for common purposes. The blade should be of patent steel, strengthened by a plate of iron along the back, and its temper should not be too hard, which can be determined by examining closely the edge of the blade, and observing that it is smooth and not serrated. A good mower always prefers a long blade, more than four feet in length. The shank or sned should always be straight and not curved. The curved may seem more convenient in form to the hand, but as the line of draught must always be straight, the straight sned always gives the greatest command over the scythe. A well dried young larch tree, barked and reduced by the plane to the desired thickness, with a natural slight curve outwards at the root end of the tree for receiving the blade in a proper position, makes the best sned for reaping. When painted, such an one will last for many years. A hone of fine sand to preserve a fine edge, and a fine sandstone to whet the edge of the scythe occasionally, are necessary appurtenances. To gather the corn and lay it down in a regular swath when cut, a simple apparatus called a rake or cradle is attached to the scythe. This rake, as its name implies, consists of three long teeth, diminishing in length from the uppermost to the undermost, fastened to an upright stem, and strengthened by two rods passing through them parallel to the stem. It should be wholly made of the finest ash, and as light and slim as the strength of the wood permits. The upper tooth should be two feet or a little more in length, and that of the other two, each three inches shorter than the one above it; and all of them curved similarly to the back of the blade of the scythe. The stem of the rake is driven into a socket of iron, but not fastened to it with a nail; the socket has a wedge-shaped toe kneed at right angles to it, in the direction of the teeth of the rake. It is fastened to the sned so as to stand in a perpendicular position when the scythe is to be used, with the same iron ring and wedges which fasten the blade and sned together. The rake stands with the socket about thirteen

inches in height, and the spaces between the teeth and the undermost tooth and the blade of the scythe, are about four inches. The adjustment of the scythe consists in placing the blade in such a position as that its point shall be as far from the handle by which the mower supports the scythe in his right hand, as the length of the blade itself, and as this handle is from the butt end of the blade. In short the butt end, and the point of the blade, and the right-hand handle, stand in the angles of an equalateral triangle; the edge of the blade for reaping, should not be so low set as that of the scythe which gardeners use for cutting grass walks, nor so high as for the cutting of clover. The left-hand handle is placed the distance of the elbow to the extremity of the middle finger of the man who is to use the scythe from the right-hand one. The right-hand handle should be curved and placed on the sned, so as the scythe should be suspended in a working position under the hand. The other hand stands in nearly a horizontal position: both are fastened in the tightest manner to the rings which slide on the sned, by the shank of the rings passing entirely through their length and rivetted. The hone is hooked on with two nails at the upper extremity of the sned; the sned is about seven feet in length, and is shod at the upper extremity with a socket and pike; the pike when inserted into the ground serving to render the scythe steady in the act of whetting. A strong cord is requisite from the outward rod which strengthens the teeth of the rake to a nail in the sned, a little below the right-hand handle, to serve the double purpose of keeping the rake in the desired position, and of laying the corn over in swath. Thus equipped, the reaping scythe should balance itself exactly on both sides of the right-hand handle.

The relation of these minutiæ will not, we hope, be considered tedious, for upon the proper adjustment of the component parts of a scythe depends in a great measure the success of reaping the corn neatly and quickly. Reaping with the scythe is hard work under any circumstances, but attention to minutiæ relieves it of irksomeness. The annexed figure 1. exhibits a mounted reaping scythe ready for work, in the position in which it is used. It will make the description of it given above easily understood.

Fig. 1



The best position of the corn for reaping with the scythe, is the upright, or a little swayed, either naturally, or by the wind from the mower. The best direction to reap in respect to the ridges, is across. The ground is then always straight for the stroke of the scythe, and the furrows of the ridges are easily cleared. In commencing to reap a field of corn, a little consideration is requisite. The general position of the corn over the whole field must first be considered, then the quarter from which the wind blows, and, lastly, the direction of the ridges. If all are favourable, the work will proceed cheerfully, if not, a compromise must be made with the opponent. The wind must be always in the back or on the right hand of the mower. A strong wind will sometimes overrule the natural position of the corn. A diagonal direction across the ridges should always be preferred to one along them. At whichever side of the field operations are to commence, that side must be entirely opened up by cutting down a breadth of corn in the line of the ridges, equal to the whole band of mowers. This cleared road-way gives access either across or in a diagonal direction over the ridges.

To carry on the reaping in a regular manner, it is necessary to classify the mowers into bands of two each, according to their ability, that each band may be equally dexterous. Two inexperienced or weak-bodied mowers ought not to be together, as they will assuredly cause a hinderance to the work, at one time or another. Let a steady good mower take the lead of

the first band, and let each band keep its leader and people and place of precedence ever after, otherwise confusion of work and wrangling among the mowers will inevitably ensue.

Every band may be arranged in this manner: two scythemen to reap; a person, generally a woman, to follow each scythe, to make bands and take up the corn, and place it in the bands in bundles ready to be bound up; a bandster, always a man, follows the women, and binds the sheaves; the two bandsters set up the corn together into stooks; a woman follows the whole with a large rake, and clears the ground of any loose corn, and brings the rakings to the bandsters, to be bound up in the sheaves or by themselves.

Some people place three mowers in a band, and in this case there will, of course, be three takers-up and three bandsters, and a man to rake to the three instead of a woman to rake to the two scythes. There is, we believe, a saving of wages by this arrangement, as the wages of women are nearly as high as those of men at harvest-work. But by the former arrangement, we are sure there will be less loss of work and time, in case any accident befal the scythe, and accidents will occasionally happen to scythes in the hands of the most expert mower *. On small farms where three mowers are able to reap the whole crop, the latter arrangement may be beneficially adopted.

Suppose, then, that two mowers and their people form a band, and suppose there are three bands engaged at harvest, they should arrange themselves by these circumstances. Sixty yards is as much space of corn as a scythe can cut easily at one sharpening, and that distance is about as far as most men can cut at a breath. Twelve ridges of five yards each, or ten ridges of six yards, will thus mark the breadth to be cut at once. Let the foremost or leading band start first to the cutting of the sixty yards, whilst the other are preparing to follow; let them then sharpen their scythes, and proceed forward other sixty yards; and while they are doing so, let the middle band commence, and they will cut their sixty yards in the same time in which

* In case of accidents, a hammer, a few stout nails, a spare iron wedge or two, bits of cord, and pieces of old hard shoe-sole leather, should always be ready in the field; and even a rough file, to rub down the point of a scythe, should it break against a neglected stone, till it can be properly adjusted on a grindstone, may prevent a considerable loss of labour.

the foremost band will have cut their second sixty yards : let both bands then sharpen their scythes at the same time. When both are ready to start again, let them continue to cut onwards, each its sixty yards, while the last band commences cutting its first sixty yards, which, when accomplished, all the bands will be in their respective places, which they must continue to occupy till the breadth of ground which they occupy shall have been reaped of its corn along the whole field, provided there is no extraordinary interruption from the peculiar state of the corn. In this manner, the band which occupies the advanced position falls back, and takes up the space which has just been abandoned by the band immediately behind it. No interference can thus take place among the different bands, while the one serves as a check upon the other, both in the marking of the time, and the quantity of corn reaped by each. A band losing time in cutting out its sixty yards, will cause delay by preventing the band in front of it entering its proper ground. A band losing ground, by lessening the width of the stroke of the scythe, will deprive the one before it of its legitimate width of stroke. Should laid corn or a stronger part of the crop interfere with one band more than another, it is requisite that the band before or behind it, should advance or fall back the breadth of one ridge or more if necessary, in order to equalise the time among them.

To ensure good work in reaping with the scythe, it is requisite to preserve a keen edge on the blade, and always keep the heel of the scythe close to the ground. The keen edge is best preserved by a broad "cannel" or chamfer, on the upper edge of the blade, and a narrow one below, and which should be sharpened by always moving the hone or whetstone from the heel to the point, because the cut upon the straw is made by moving the scythe from the point to the heel. Many able mowers cannot preserve a keen edge on their scythes, because they are not aware of the necessity of attending to the difference of the chamfers on the upper and under edges of the blade, and through this ignorance, they move the hone or the whetstone both up and down the blade, thereby counteracting with one stroke the good effects of the previous one. The hone, if kept dry, will always preserve a keen edge on the scythe, with the assistance of the whetstone once or twice a-day. It is great work to cut constantly a width of

7 feet and a-half, and from 10 inches to 1 foot in breadth at every stroke. We have often observed a particular man, however, cut 8 feet in width and 15 inches broad at every stroke with apparent ease, and this without any stimulus, and without even knowing that we were watching his labours. He was by no means a powerful man at any, but very dexterous at every kind of field-labour, and he was a striking example of the superiority of science over physical strength. He was desirous of working with a scythe, at least four and a half feet in length.

The rake attached to the scythe requires a position differing with the nature of the crop. When the crop is an average one, it should be placed in a line with the back of the blade of the scythe; when a strong one it should be kept within the blade, and when a thin one it should be projected a little beyond the blade. These necessary changes in the position of the rake for collecting the severed corn in a proper manner, will explain the reason why its stem should not be fastened with a nail into its socket. The momentum acquired by the scythe carries round the dissevered corn, and the cord which stretches from the rake to the sned directs the fall of the corn into the swath. The straws of the corn should be parallel to one another in the swath, and the direction of the swath should be at right angles to the line of motion of the mowers.

The corn from the swath must be carefully placed into the bands, and if any of the straw is by accident disarranged by the scythe, it should be adjusted. The taker up must also be careful in placing the bundles of corn square upon the bands, so that the sheaves would be balanced when tied. Inattention to this necessary arrangement may not only cause much hinderance to the bandster in its adjustment, but trouble to the person who forks the sheaves into the carts which convey them to the stack-yard. In the act of lifting a sheaf with the fork, the most advantageous hold is obtained of it at the band or tying, and if that is not so placed as to balance the sheaf when lifted, the forker has little command over his object. Each taker-up may make bands to herself from the loose corn as they are required for the bundles; but as this operation would be rather too tedious at that time, it is advisable for the takers-up and the bandsters together to make a sufficient number of bands from the loose corn when the mowers are sharpening their scythes, and

lay them down regularly near the side of the standing corn to be next cut, within reach of the foremost taker-up, who can easily hand over every other band to the taker-up behind her. With a good crop the mowers will keep the takers-up and bandsters hard at work, with their best exertions and happiest expedients.

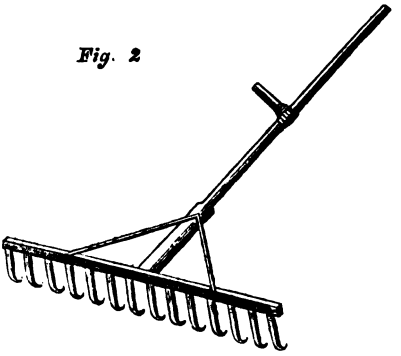
When reaped with the scythe, corn cannot be put into too large sheaves, provided they are not larger than they can be wielded without much difficulty. The largest sheaves of oats reaped with the scythe will, in general, be ready for the stack in eight days. Large sheaves clear a field with few liftings, and they advance the construction of a stack at a rapid pace. We are quite aware that large sheaves of corn reaped with the sickle are very detrimental to the progress of gathering in the fruits of the earth, and, of course, we would not recommend the same practice in regard to them as we can safely do in regard to corn reaped with the scythe.

The bandsters ought to bind the sheaves very tightly, the large sheaves shrinking considerably in the drying. The bottoms of the sheaves should be trimmed of all superfluous straws. The stooks should be set exactly in the direction of north and south. In that position they derive the greatest advantage of sun and air combined, to dry them in the shortest time. Twelve sheaves of oats and barley, and fourteen of wheat, form a stook, with hood-sheaves. In dry weather wheat is seldom hooded. A little space left between the sheaves will greatly facilitate the drying of the stook, by the free admission of air.

The raking process cannot be expeditiously enough performed by a common hay-rake. The head of the corn-rake should be made of fine ash, as light as possible, but strong enough to bear the driving in of a number of iron-teeth; and it should be at least five feet in length, and feruled with iron at both ends. The teeth should be seven inches in length, and four inches apart, and so curved at their points as that the weight of the rake may rest upon the curve, with their points free of the ground, when the rake is held in a working position. The points of the teeth should be thin and broad. The shank of the rake may be of light fir, and fully six feet in length. An iron rod passing from the shank on each side to the head, will prevent the latter being twisted out of its position. A short

handle, like the left-handle of the scythe, and fastened at a convenient spot on the shank with an iron wedge, will facilitate the passage of the rake over the ground. The principal duty of the raker is to clear the ground passed over by the bandsters, and to bring the rakings quickly up to them. The rakings are most easily got rid of by pushing the rake with both hands backwards, in a nearly horizontal position. The labour of raking depends altogether on the state of the crop. The straw of a good crop adheres together, and of course little of it straggles away to be raked together; but a scanty crop produces abundance of rakings. Barley generally leaves more rakings than any other kind of crop. It is more difficult to rake upon new grass, such as in reaping wheat and barley, than on a clean stubble, as of oats. The following figure will at once give an adequate idea of the rake. It is drawn on the same scale as the scythe.

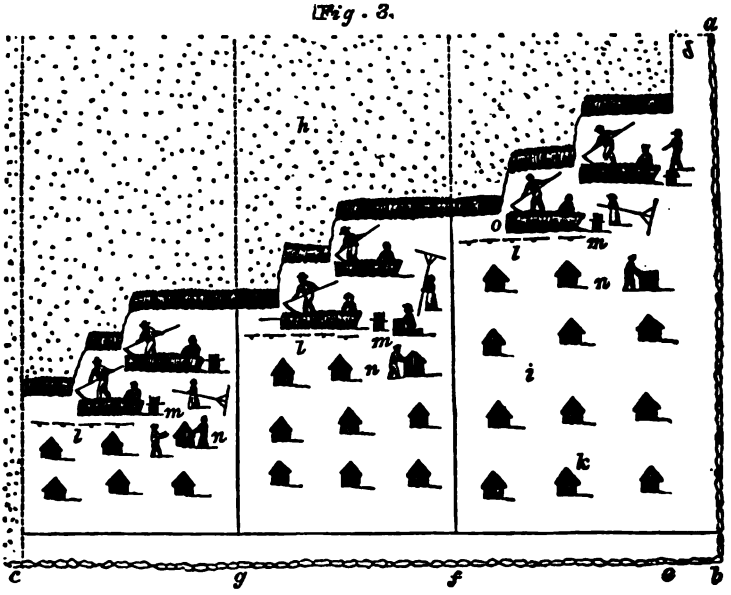
Fig. 2



In case the verbal description above is not sufficient to give an adequate idea of the arrangement of the bands of mowers, and as their proper arrangement forms the best illustration of the utility of the scythe as a reaping implement, we subjoin a cut representing a portion of the harvest-field, in which the figures of the different people employed in the harvest-work may be recognised by the implements which they are represented to hold, or by the particular nature of the work which they are performing.

Suppose that the wind is from the west, and the corn inclining by it to the east, then *a b* will be the west, and *b c* the north fence of the harvest-field; *d* is the space opened up at first on the west side of the field; *e f*, *f g*, and *g c*, are each a space

Fig. 3.



of 12 ridges, of 5 yards each, for the occupation of the respective bands of mowers; *h* is the standing corn; *i* the stubble; *k* the stooks; *lll*, the bands ready laid down for the sheaves; *mmm*, the sheaves ready to be bound up; *nnn*, the bandsters setting the stooks; and *o*, the corn in the swath. The progress of the work may then be easily imagined.

If circumstances will not at all permit of the arrangement which is represented in the figure, modifications may be introduced in the relative position of one band to another; but under any arrangement, the persons in the same band must always be in the same relative position to one another. The cutting diagonally across the ridges does not necessarily make any difference in the arrangement. When corn, however, is very much laid, it is impossible to pursue this regular arrangement. The six ridges, or whatever other portion of land allotted to each band, must then be reaped across, along, or diagonally, as may best suit the position of the corn. Although it is impossible to lay over very laid corn in a regular swath with the scythe, the corn can be cut with it fully more perfectly in regard to leaving a neat stubble than with the sickle. In such a case, the taker-up has the most difficult task to perform.

Rank grown laid corn, with its supple straw, presents a formidable difficulty to the bandsters in the setting of the unwieldy stooks. The additional quantity of straw obtained by reaping with the scythe is very considerable.

All sorts of grain may be reaped with the scythe. Oats make the most perfect work, with the greatest ease to all the labourers. Barley with new grass is not difficult to cut, but the clammy juice from the barley-straw lubricates the scythe with a viscid coating like varnish, which must be rubbed off frequently with the whetstone. The bandsters have always hard work among barley. Wheat is beautifully laid in swath when mown. The takers-up and bandsters have less labour among wheat than the mowers, who must be powerful men to continue a length of time at the work. Indeed some farmers, who use the scythe pretty extensively in harvest, reap the wheat with the sickle. There is no necessity for this change. Men can reap a strong crop of wheat with the scythe as well as the other kinds of grain, provided they are not kept day after day at it for a length of time. Their physical energies could not withstand the fatigue. But there are modes of equalizing this labour, and of course of diminishing the fatigue. For example: When a field of wheat and a field of oats are nearly ready for reaping, it is an excellent arrangement to reap the oats in the dewy mornings before breakfast, or as long as there is any dampness on the corn, and then to go to the wheat, or to the barley if there be little wheat on the farm, during the dry period of the day. By this plan much valuable time can be saved in reaping the whole crop. Oats are not the worse of being reaped in a damp state. It is a remarkable fact, that oats reaped in a damp state with the scythe will be nearly as soon ready for the stack as when reaped dry. Not so with barley. Stooks of oats which are reaped dry, but have afterwards been soaked with rain, will be longer of being ready for the stack than oats that have been reaped in a damp state. It is a still more remarkable fact, that damp oats reaped with the scythe will be sooner ready for the stack than would the same oats reaped in a dry state with the sickle. Oats reaped with the scythe will be quite ready for the stack in eight days, whereas oats reaped with the sickle require at least a fortnight; and stooks that have been reaped with the

scythe will avert much more rain than those reaped with the sickle. We remember a remarkable instance of this, and have repeatedly witnessed the facts mentioned above. After a quantity of potato-oats had been cut down both by the sickle and the scythe in the same field, an uninterruptedly heavy rain fell for three days. We expected the rain to have soaked through every stook. When they were examined, however, after it faired, the stooks which were reaped with the scythe were only wetted on the outside, and every sheaf was quite dry in the heart; and they were ready for the stack in a short time after; whereas those which had been reaped with the sickle, were not only soaked through, but they had all to be loosened out to the sun and wind before they could be stacked a fortnight afterwards.

This difference, strange as it may appear, is not difficult to be accounted for. Corn reaped with the sickle, being gathered firmly in the hand, its straw in the sheaves becomes as it were a bundle of parallel rods, between which the rain easily enters, and passes among them into the half-crushed straw in the heart of the sheaf, where it lodges as if in a sponge, and where little air can penetrate to evaporate moisture. On the contrary, a sheaf reaped with the scythe is always in an open and loose state through which the wind can freely pass; and its outside coating consists not so much of a bundle of parallel rods, as of a kind of net-work of straw, the several threads of which direct the rain to some projecting piece of bent straw, which serves as a spout to throw off the water from it to another till it reaches the ground. These tricklings of water from point to point we have often observed along the sides of the stooks which were reaped with the scythe, with a curious satisfaction. In other stooks, the dropping of water is almost always confined to the lower ends of the hood sheaves; the side sheaves, from the circumstances already mentioned, and their inclined position, absorbing most of the rain which falls against them.

When the farm-servants are employed at harvest-work, a certain number of them must constitute a band by themselves, in order to carry on the leading in of the corn when it is ready to be stacked. This band should be placed last, and it should consist of six men and a woman. They will be capable to lead in the corn as fast as it is ready. One of the men forks the corn in the field, two drive carts if the distance of the stack-yard from the

field is short, and three if it is great, one stacks it, and the other assists in trimming the stack, forming stools for new stacks, commencing a new stack when the stacker is finishing the top of the old, and handing the sheaves forward to the stacker on the top of the stack, when it becomes so elevated as to interfere with the drivers throwing the sheaves off the fork from the cart, while the woman remains in the field to rake with a hay-rake the ground which had been occupied by the stooks. The extra man in the stack-yard assisting the stacker, will be found to be no supernumerary, but a very efficient labourer, not only in what he does himself, but his wages are greatly more than repaid in the time which he bestows on the horses to perform more labour. It is obvious that should the stacker receive no assistance, and should a loaded cart arrive at, when the empty one is going out of, the stackyard, and which should always be the case when the leading is carried on with spirit, much valuable labour of the horses must be lost in thus waiting on the stacker, while he trims the stack, finishes its top, makes a stool for a new stack, and while the driver forks the sheaves with difficulty from the cart to the top of the stack. Suppose only six minutes are thus lost on each journey, ten of which may easily be performed in a day by a pair of horses in leading corn, an hour's labour will thus be lost on each pair thus employed every day. A man's wages shrink into insignificance when compared to this sacrifice, which is too often made through thoughtlessness both of master and servants. Were a man to be stationed in the stack-yard, he could trim the stack, hand forward the sheaves in a proper position to the stacker, when the stack rises above the cart-load of corn, and commence the bottom of a new stack, while the stacker is tying a straw rope round the top of the one which he has just finished, and which will save him the trouble of remounting to the head of it again for that purpose. He can roll up the cart ropes, and give the horses a few tares or their feed of corn to eat while the cart is unloading. He can form stools of straw for the new stacks, and rake up all the corn that may have fallen around the stack just finished. By these little services, which must all be performed by the stacker himself while the horses are waiting, he will save a great deal of time both to the stacker and the horses, by which the latter will be

enabled to carry in more corn in the same time, and the former less fatigued to stack the extra quantity thus brought in, than by the method which is ordinarily pursued, of leaving the stacker by himself.

A mower will reap oats as fast as a bandster can bind them into sheaves and set them in stooks. It is good work for a bandster to attend six reapers with the sickle; and six reapers will reap two imperial acres in a day. A mower then can reap two imperial acres of oats in a day. Taking this quantity as a datum, we shall be able to ascertain the expense of reaping with the scythe. A mower will require 3s., the bandsters 2s. 6d., and the takers-up and the rakers 2s. a-day each, besides their meat: this is, however, a high rate of wages. The meat consists of oat-bread or flour-bread and beer. The oat-bread is generally baked with yeast, and ten loaves are formed out of a peck of meal, that is, each of them weighs fourteen ounces. Some people form twelve oat-loaves out of the peck. The flour-loaf is the fourth of a quartern. The allowance of meal for supper when the harvesters go to their own houses to sup, is 2½ stones of meal for the harvest, which is about equivalent to two oat-loaves each night, without beer. When the meal and beer are estimated at retail price, the cost of harvest-work will be then for each band of mowers,—

Ten oat-loaves out of a peck of oatmeal, at 1s. per. peck, and 2d. per peck for baking them with yeast, = 1½d. per loaf, nearly.

1 loaf to each harvester at breakfast - -	L. 0	0	1½
1 do. do. dinner - - -	0	0	1½
Oatmeal as an equivalent for 2 loaves at supper to each harvester	0	0	3
2½ quarts of beer to each harvester, at 1d. per quart -	0	0	2½
Daily expense of the meal of each harvester,	L. 0	0	8½
7 Harvesters at 8½d. per day - - -	L. 0	4	11½
2 Mowers at 3/ - -	0	6	0
2 Bandsters at 2/6 - - -	0	5	0
2 Takers-up and 1 Raker, at 2/ - -	0	6	0
Expense of a band of mowers per day,	L. 1	1	11½

2 Acres at L. 1 : 1 : 11½ = 10s. 11½d. per acre.
With loaf bread at 2½d. per harvest loaf, the expense of reaping would be 11s. 2½d. per acre.

But the actual cost to the farmer does not amount nearly to either of these sums. Experience proves that with oat-bread the outlay of money in reaping with the scythe does not exceed 6s. 6d. per acre for oats, 7s. 6d. for barley, and 9s. for wheat. This difference arises chiefly from more work being done by the

reapers than has been estimated above, and from the value of the beer and the oatmeal being less than the estimated retail price. But under any circumstances, the expense of harvest-work will of course be less with oatmeal than with flour; and with either it will be less with the scythe than with the sickle.

ON A METHOD OF PREVENTING THE ATTACKS OF CATERPILLARS ON FRUIT-TREES AND BUSHES. *By Mr* WILLIAM BROWN, *Pinefield, near Elgin.*

AT this season of the year, when caterpillars generally attack fruit-trees and bushes, the following method of preventing their attacks may not prove undeserving of notice. Let a hole be bored in the stem of the tree, as far in as the heart, in a direction sloping downwards, about a foot from the surface of the ground. Into this hole pour a little mercury. Close up the hole with a peg, not very tightly fitted in. Cut the top of the peg smooth with the bark of the tree or bush, and then put a little tar over it to prevent water getting into the hole. This I have found a safe and sure method of not only preventing the attacks of caterpillars, but of driving them off the tree; and it is not yet, I believe, publicly known.

ON THE CULTURE OF THE PRICKLY COMFREY, OR SYMPHYTUM ASPERRIMUM.

(To the Editor of the Quarterly Journal of Agriculture.)

I HAVE perused, with considerable interest, the article on *Cichorium Intybus*,—wild succory, styled by Mr Gorrie of Annat, the writer of the article *Chiccory*. There are many facts detailed in that paper, which are both gratifying and highly interesting to the occupiers of small pieces of land, who are anxious to render them productive to the utmost of green or other fodder for the cow and the pig. My present object is not, however, to enter farther into notice of the chiccory, a term doubtless derived from the French *chicorée à café*, or *chicorée à*

navet, than merely to mention that the common succory is cultivated extensively in Flanders and France; partly as a green herb for fodder, and as a substitute for endive; and considerably as a substitute for coffee; the roots of it for this latter purpose being cut into pieces, dried or roasted, and then ground into powder.

I observed in Mr Gorrie's paper a passing mention of the plant, which he designates the "far-famed *Symphytum asperrimum*;" and it is upon this plant that I propose to offer the following practical remarks. I conceive myself to be in a degree qualified to do so, inasmuch as I have cultivated it with assiduity, for the express purposes of my own domestic economy, during the course of three successive years.

Before, however, I enter upon the details of its culture and applicability to the objects for which it was so highly recommended, I may offer the few following remarks upon the history and botanical character of the plant.

The prickly comfrey, according to the letter addressed by Mr D. Grant, nurseryman, Lewisham, Kent, to Lord Farnborough, is described as "a hardy perennial of gigantic growth, introduced from the Caucasus, as an ornamental plant, in 1801, by Messrs Loddiges of Hackney, as specified in Curtis's Botanical Magazine, No. 929."

The genus *Symphytum* is referred to the natural order Asperifoliæ, that is, to a division of the fifth class, and first order of the system of Linnæus (*Pentandria Monogynia*), characterised as having the "flowers monopetalous, inferior, with two or four naked seeds," the herb being altogether rough and hairy. The essential generic character is "a corolla closed, with awl-shaped converging valves; limb or border wheel-shaped."

In the natural system of Jussieu, *Symphytum* is to be found in the sixth class, *Corolliflorœ*, wherein the stamina adhere to the corolla, which is not attached to the calyx or flower-cup; and in the 13th order of that class, *Borragineæ*, the type of which is *Borago*, Borage, whence the name.

The species under consideration agrees in most respects with the native species, *Symphytum officinale*, in as far as it is "herbaceous, perennial, hairy and bristly;" the *leaves* long-pointed,

rather ovate, and veiny; "*clusters* of flowers revolute, drooping," with a most graceful bend or curve; roots abounding with mucilage, fleshy, forked, and penetrating deeply into the soil. The flowers, before they expand, are of a beautiful crimson or purplish tint, very much resembling those of the viper's bugloss (*Echium vulgare*). When fully open, they are of a delicate but rich cerulean blue. The seeds, as they ripen, assume a dark brown, and finally black colour, and if not collected at a critical period, fall to the ground and are lost. I have not found them to be fertile, generally speaking, if gathered and sown in the following spring; but if suffered to fall, and then removed with some of the earth from around the roots to another spot, a seed-bed may be formed which will produce a plentiful crop of young plants. My bed of symphytum shed abundance of seeds in the summer of 1831. I collected a few from the plants at that period, but scarcely three of the whole number vegetated; whereas, having occasion to remove the bed, some barrow-loads of the soil were thrown down in a new situation; and, to my surprise, a crop of young plants arose, where, from the depth to which the seeds must have been immured, I had no reason to expect one. This occurred in the following spring, eight months after the seeds had fallen from the calyces of the flowers.

In order to arrive at some definite conclusion concerning the importance and real worth of the plant, I shall state some facts connected with its mode of cultivation. I was, in the autumn of 1830, induced by the recommendation of a neighbour, and the highly laudatory accounts in some of the public prints, to purchase fifty plants of this symphytum. I received them in November; they were very small, somewhat resembling young primrose plants. They were immediately placed in a bed of rather strong, but sandy loam, abounding with chalky particles, three feet asunder, in rows four feet apart. In spring I perceived that several had perished, in consequence of a large quantity of snow that had accumulated, and lain about that particular piece of ground for a considerable time. The lost plants were replaced by others, procured in the beginning of April 1831. In common with many other herbaceous plants, the symphytum will remove with the greatest safety and success just at that pe-

riod when, after the recession of the winter frosts, the ground is in a meliorated and readily pulverable state, and the herb in an excitable state, and just beginning to push. If transplanted in the autumn, when dormant and unexcitable, the accumulated *prepared juices*, that are deposited by the leaves before their final decay, frequently become decomposed by frosts, damp, and particularly by a mass of snow; and decay takes place. This seldom, however, occurs when the plant has remained undisturbed; because the vessels are not lacerated, and, therefore, the connection between the root or hybernaculum and the soil continues uninterrupted. My plants, from the period referred to, grew rapidly, and spread extensively, they fully occupied the space allotted to them, and notwithstanding the memorable and extensively destructive frost of the 7th May, I could not perceive that a leaf was injured.

I had occasion to remove nearly the whole of my plants, and at the latter end of February 1832, transferred them to a broad border of an orchard, with a north-east aspect. The greater part of the roots were found to be from ten inches to a foot and a half long, readily divisible; they were very succulent, mucilaginous and tender; their internal substance was of a dirty-white, but the cuticle of a dark brown colour. These plants stocked the border, the length of which is twenty-six yards, and the breadth about six yards. They were in number about one hundred and fifteen, and were set in holes, distant three feet by four from each other; and by the end of the month of June, the leaves met, and covered the surface.

After these general facts, I proceed more particularly to notice the soil in which it grows. Mr Grant, in his circular, says, "it will grow in all soils and situations, superior to any other plant; it may be planted by the sides of ditches, in any waste corner of fields, orchards, gardens, &c. where useless rubbish grows." I have tried my plants in every species of soil that I possess, from that of the unprepared, untilled land of a field where the roots of an adjoining plantation of elms had taken undisturbed possession for years, to the richest manured plot of a kitchen-garden. The spot where the bulk now stands, was a soil degraded by rubbish of every kind; it was artificial, and a set of sheds and out-offices of a farm-yard had been erected.

on it; brick-bats, lumps of chalk, fragments of glass-bottles abounded; and what with these, and the roots of elm-trees, the work of trenching was effected with much labour and difficulty. If the plant have thriven better in one soil than in another, it is perhaps in a sort of stiff but pale sandy loam, which by analysis I have found to contain in 200 parts, when dry, about 150 parts of siliceous sand, of chalk 15 parts, aluminous impalpable matter 12 parts, oxide of iron 6 parts, and of vegetable fibre or water, not separated by the previous process of drying, the remaining 17 parts.

In regard to their propagation, the plants may be raised from seeds, subject to the difficulty already alluded to; but they may be multiplied to any extent by separation of the roots. These may be torn asunder, chopped lengthways with a spade, or more cautiously divided by the knife or bill-hook, during any period of the growing season; but decidedly, by preference, just before the central shoot has pushed above ground. They succeed under all these modes of separation, and make fine large plants in a few months. Upon this subject, however, in the very early progress of my experience, I wrote to Mr Grant, and received a reply of date May 1831, wherein he stated, that the roots "may be planted at any time when you may wish to increase your stock, care being taken to have a *part of the crown* with each cutting. It increases freely. I made it from *two plants to* 40,000 *in five years.*"

The very young plants make rather slow advances after removal in the spring, for a month; but if rains fall, and genial temperature supervenes toward the middle of May, they set off rapidly and extend in every direction; the flower-stem is soon developed, and will be perfected in July. But plants made by separation of the larger plants, I have found to grow and expand with amazing rapidity; they resemble in this respect the gigantic rhubarb, *Rheum hybridum var.*, which I have always observed to be accelerated by removal in spring.

"I went down to Lewisham last week," says Mr W. W. Farnes, in the Farmer's Journal of 14th June 1830, on the growth of the symphytum, "and can assure you I was very much pleased, I may say astonished, at the produce; it was beautifully in bloom, and some of it near seven feet high. All that Grant has

said of the produce and quality seems to be correct; from the taste of it, I think there can be no doubt but it contains a great deal of nutritious matter. I saw one plant which, I was informed, had been planted three years, containing thirty-two stalks, none of them less than six feet high, and from one and a half to four inches in circumference. The plant was cut and weighed this day, in the presence of Mr W. C. Selby of the Bridge-house Farm, Lewisham, and weighed 56 pounds."

I never saw the flower-stems of my plants above five feet high, but then, till the present season, none of them have been at rest; they have not been in undisturbed possession of the soil, and have been cut over so repeatedly, as to prevent the roots deriving all the vigour and energy which would have been afforded by the foliage, had the stalks been suffered to grow uncut or unpulled during one entire summer.

The experiments that have come under my notice have been made in latitudes coinciding with that of London; but I have observed no difference in the strength and verdure of the leaves, be the aspect what it might. A large part of my stock of plants is shaded by a south-west fence, and although hoar-frost and general cold temperature have prevailed throughout March, and the three first weeks of April, I have already drawn off the leaves in succession, from above one-half of the plants; and so rapid is the growth, that by the time the whole shall have been pulled, the operation may be recommenced. A bushel basket nearly of the leaves is collected daily, and given to a cow; and this in a season when the grass of the same orchard is just assuming a full green tint, and *beginning* to lengthen; and an *adjoining* patch of last year's lucerne is only protruding its first shoots above the surface of the soil.

Mr Grant observes that he once "cut and weighed one square rod; the average was seventeen tons, three hundred per acre."—He says it rises to more than seven feet in height, and so thickly, as completely to cover the ground on which it stands; that by the first of April (1830), "it is now fit for cutting." I have not as yet observed it to attain so great a height, but I have often taken a cutting from the crown, placed it in the border or shrubbery, and have seen the herb spread during the same summer to the breadth of nine or ten inches, the flower-stem to rise

to the height of four or five feet, and the root to penetrate the ground far beyond the depth of a spade, and to an extent that would have furnished three or more fine large plants. Mr Grant represents the leaves to be eagerly eaten by horses, and this I, as well as a highly respectable neighbour, have proved to be the fact. "Cows do not take it in the first instance so freely as the horse, but they all soon take to it, and then they are quite as eager for it." The fact is, that if it be offered to a cow when the flower-stem is grown up, the whole stalk and its foliage are so very prickly and rough, that the animal seems to shun it. During the summer of 1832, I greatly feared that the attempt to feed cows with symphytum would end in complete failure. In that season, we invariably cut it over with a reaping-hook; the leaves were frequently eaten, but the stems were left. The present year, however, I determined should witness another mode of procedure, and as soon as the first leaves were fully expanded, I directed them to be drawn up and not cut off, and every leaf is now greedily devoured. Dr Withering says of the common comfrey (*Symphytum officinale*), "cows and sheep eat it; horses, goats, and swine refuse it. The roots are glutinous and mucilaginous."

The roots of the *S. asperrimun* are the same, and I find that cows will eat them freely. The plant also will etiolate or blanch to perfection, as I discovered by finding one in a bed of damp leaves: it was eight inches high, and as white and crisp as a plant of celery. "Sheep and lambs will take it freely. Lambs will all feed on it before they are a month old, and as it is such a very early plant, it will immediately follow the turnips." I cannot from my own experience determine the correctness of this observation.

Mr Grant finally observes, that it is very useful to pigs; that he "kept a sow with twelve pigs chiefly on it; she brought them up well; they all fed on it before they were three weeks old. Geese do well with it, the young ones will feed on it as soon as hatched." I have invariably found that pigs will eat the symphytum leaves freely, and the stalks also, to a considerable extent; but as to geese, my experience by no means justifies Mr Grant's assertion. I have left leaves all night about the farm-yard, when the geese could get at no other food, and

could never perceive that one had disappeared. The goslings also refused them at any age, even when chopped up. I had, however, the experiment repeated yesterday, that I might, before closing this paper, either confirm my past observations, or obtain an exception in the favour of those of Mr Grant, and the result is doubtful. The goslings, it is true, had grass at command, and some young sprouting clover. They would not eat the cut leaves at the time, but they have disappeared during the night. I conclude, therefore, that where *grass* is of ready access, the geese greatly prefer it.

Upon the whole, then, considering the precocity of the crop, the plant fairly rising early in April, if the weather be at all genial, and extending with great rapidity; the frequent recurrence of the gatherings; the great abundance of green fodder yielded, and that, for a period of seven months; the quality of that fodder, which appears to be nutritive, and of a mild bland flavour; I arrive at the conclusion that *Symphytum asperrimum* ought to be considered a valuable adjunct to the byre and farm-yard; that it ought to be tried by every impartial experimenter without hesitation, and if the success be equal to that which has attended my trial, I have little hesitation in believing, that a piece of comparatively useless ground may be profitably set apart for the culture of so productive a vegetable.

As a caution, and in order to secure the permanency of the plantation, I would enforce the practice of pulling up the leaves, instead of cutting the whole plant over. Grant observes, that he "cannot undertake to say what effect continual cutting may have on a plant, or on the land for many years together; but that he had never known one to die, though some have stood more than twenty years, and in as full vigour as at the first." It may be pulled three or four times at the least, that is, the full grown leaves may be taken from around the stems; the stems as they advance to a foot high may be broken off to within three inches of the soil, and thus the plant may be always kept down by deforming or mangling it, and some foliage will at all times remain to be acted upon, and stimulated by solar light.

With respect to tillage, I should recommend that, after the

final gathering, the spaces between the plants (which should be at the least three feet) be roughly dug or ploughed, and left neat for the winter; that during the first dry and favourable interval, about the middle or close of February, another *deep* moving of the soil be given, and a little of the mould brought round the plants; and that during the growing season, the ground be kept clean and neat as time will permit. If at any time the surface become hard-bound by treading over, great benefit will be derived from a second stirring of the soil, but that not to such an extent as to injure the roots.

Manuring may, in some soils, be of use, but I have not observed that it has produced any great advantage; my plants appearing to be as strong on those spots where none has been applied, as on others where a dunghil had previously stood.

I hope the foregoing remarks will stimulate many liberal minded cultivators to introduce this plant. It is not required to substitute it for grass or other well tried staple produce; but as of late it has been the earnest endeavours of the philosophic writers of the day to bring into notice any productive vegetable that may advance the comforts of domestic economy, particularly in the homesteads of those who possess but a small portion of land, and very limited means of support; it surely is desirable that *Symphytum asperrimum* should be permitted to take its chance with Hemerocallis, Cichorium, Italian Rye-grass or Gama grass. The wise man economises in every thing, and though it is to be lamented that the price of the first parcel of Symphytum must be considerable, (that is, presuming it be still rated at 20s. per hundred plants); yet fifty of these would, as I have found, suffice to stock a large piece of ground in little more than six months. I believe that, by suffering one or two plants to ripen and detach the seeds, and by a careful attention to the young seedlings, in connection with a proper division of the roots in the second of March after planting, an acre of ground might be sufficiently cropped with this most prolific herb.

J. T.

A METHOD OF PREPARING FOOD FOR HORSES.

SINCE the publication of Mr Dick's paper "On cooking food for Horses" in this Journal,* many applications have been made to him to ascertain the best mode of preparing and administering the food of horses. To gratify this laudable curiosity, we shall endeavour to describe the mode which is practised with success by Captain Cheyne, late of the Royal Engineers, in his posting establishment in Edinburgh. To that gentleman's liberality we are indebted for the following particulars, which, to have brought to their present degree of perfection, have cost him many experimental trials.

We shall not go over the ground which has been already so well traversed by our valued correspondent Mr Dick, in regard to the nutritive qualities of the various states in which the various kinds of food which are given to horses are best secured, but proceed at once to prescribe the recipe for compounding and administering that food, with some reasons for adopting that particular recipe.

The grains which are to be allotted for the feeding of horses, should be ground into fine meal. It is not necessary to sheal the grain. The outward skin or shell may be ground down with the meal. As cut grains part with their nutritive properties more easily and effectually in the stomach than whole ones, so grains ground into fine meal are more easily digested than cut grain. The digestion is assisted by the additional quantity of saliva which is required to moisten meal as much as raw grain. For example, if a person takes a mouthful of wheat, he will, by merely moistening the outside with very little mastication, be enabled to swallow the grain; but if he takes the same weight of flour into his mouth, a much larger quantity of saliva will then be necessary to moisten it for this purpose. We observe from an experiment which Mr Dick made, that eight ounces of saliva are discharged in a minute from the salivary glands of the horse when he is eating his food. Allowing this quantity to be a fixed quantity, a longer time will be required to swallow

* Vol. iii. page 1024.

a given weight of meal than the same weight of grain; and of course a given weight of meal will be moistened and prepared for digestion with a greater quantity of saliva than the same weight of grain. Hence we may conclude, that as the larger quantity of saliva will be required to moisten the meal the finer it is ground, so the finer the meal is ground, weight for weight, the better will it be prepared for digestion.

The next consideration is the state of the hay. It must have been observed by every one who has paid the least attention to the manner in which a horse eats hay, that he is obliged to masticate it for a great length of time, before he satisfies himself. We can easily see, that the time thus spent in mastication cannot be required merely to fill the stomach of the horse; but that the long hay being tough and hard is difficult of mastication, and therefore the quantity which is actually necessary to fill the stomach requires a long time to be reduced into that state which is the fittest to be received into the stomach. On this account, if a horse is very nice in his eating, (and horses have their peculiar tastes and fashions in eating their food as well as men), he will require almost the whole night to satisfy himself; and were it not for the curious construction of the horse's legs, by which he is enabled to rest standing, he would be rendered unfit for much work, by his remaining so long on his legs while he appeases his hunger. Every one, too, who has travelled long journeys with his own horses must have observed, that even with the assistance of a feed of corn, two hours at eating hay are at least necessary before the horses are ready to start on a fresh stage, not because they were really fatigued with their previous stage, but that they might appease the cravings of hunger after a labour which may have only been a recreation to them.

It were certainly a desirable object, could the *labour* of eating be lessened to that useful animal, which works with so generous a spirit for his master. We feel a hard crust severe to our own gums, and we soften it into a bread pudding. A stockfish is a very tough morsel, but after it is severely beaten, boiled, and mashed up with boiled potatoes, it makes one of the best of fish pies. Now, chopping the hay in small pieces by such an implement as the hay-cutter which we described in our last number, would prepare this portion of their food for horses, as

what we accomplish by cookery for ourselves. Hay is much more easily masticated when chopped, than in a long state. There is a considerable quantity of nourishment in well made hay. But the great object of chopping it, is not so much to facilitate its mastication, as to expedite its entrance into the stomach, in order it may the sooner undergo digestion and impart nourishment to the horse. Hay being more difficult of digestion, remains longer in the stomach than grain, and by distending the stomach to a certain degree, it prevents the feeling of emptiness with which hunger is always associated. Chopped hay being more easily taken into the stomach than long, the stomach by its use will be the sooner distended and feel satiated.

By reasoning on the bare fact, that saliva promotes digestion by moistening the food which enters the stomach, it may be thought hurtful to shorten the time required for mastication. To a certain degree this remark is well founded, for there is no doubt the longer mastication continues, the longer will the discharge from the salivary glands continue. In the ordinary time, however, which is spent by a horse in filling his stomach with hay, mastication is continued to a fatiguing extent. Mastication pursued for an unnecessary length of time, not only fatigues the muscles of the jaw, but wears down the teeth. Hard meat soon obliterates the marks of the teeth in horses; and as these marks are indications of the age of the horse up to a certain period of his existence, a horse that has been constantly fed on hard meat appears older by the state of the marks on his teeth than he really is.

The grains which are given to horses as food, are oats, beans, and barley, and the hay is either well-made meadow-grass, or natural grass hay as it is termed, rye-grass hay, or clover-hay, that is, a mixture of red-clover, and annual or perennial rye-grass, according as the grass is allowed to exist longer than one year in the rotation. There is little natural grass hay in Scotland, excepting in some parts of the Highlands where the artificial grasses are not yet much known. With these materials, fifteen pounds of the following mixture would not only be sufficient to be given to a working horse three times a-day, but might be considered high feeding: of oatmeal 8 lb., bean-meal 2¾ lb., and hay 4¼ lb.

But the value of horses' food may be greatly economised by the introduction of steamed potatoes and chopped straw. A steaming apparatus of cast-iron, adapted to a large establishment of horses, could be erected for L.5. It consists merely of a steam-boiler, of cast-metal, with a connecting pipe for conveying the steam to a barrel or barrels, which are filled with washed potatoes. The barrel has two bottoms, one a whole one, over which the condensed steam flows through an opening in the side near the bottom; and another above it perforated with holes to admit the steam to arise among the potatoes. A cover is fitted to the barrel to prevent the escape of steam afterwards. The process of steaming should be carried on slowly, that every potato may be dressed to the heart before its skin cracks. When convenient, after the potatoes are perfectly ready, which they will be from one-half to three quarters of an hour, they should be emptied into a tub, and mashed into a pulp. The steam-boiler may be erected in any out-house, or rather it should be placed in an apartment which can be locked up, as the supply of meal and potatoes should be kept near the boiler. The byreman, or a woman, could easily wash the potatoes, light the fire, and steam the potatoes.

There is only one objection to the use of the potato as a prepared food for horses, namely, the impossibility of keeping them for use during the summer. On farms this objection is not insuperable, for, during the summer, farm-horses enjoy a run at grass; but this expedient cannot be adopted in posting and coaching establishments in a town. It is, therefore, an important consideration for postmasters and coach-proprietors, in an economical point of view, how they can procure the use of the potato during summer. Much grass at a time cannot be favourable to horses accustomed to go at a high speed. Feeling this difficulty, Captain Cheyne considers the discovery of a mode of keeping potatoes in summer as an important one, and suggests the idea of slicing and kiln-drying them. Any treatment which would deprive them of vitality would no doubt preserve them. We know they may be kept till August among a little sand, at a depth of five feet under the surface of the ground. Were this plan to be adopted, a space of ground would require to be kept for the purpose. The soil, to the depth of five feet,

should be thrown out when the potatoes were pitted in the early part of spring. The bottom of the pit should be drained to carry off all the superfluous water which may find access into it. As the supply was daily (or perhaps twice a-week would be frequent enough), taken out, the earth in the pit could be trenched over towards one end, or thrown out altogether. This experiment is well worth the attention of both families and gardeners.

The substitution of straw for hay would very much economise the food of horses, especially in large establishments of posting and coaching, and on farms. Straw, weight for weight, cannot, of course, contain so much nutritive matter as hay; but that it does contain much nourishment, every farmer who has wintering cattle, and who gives straw to his horses in winter, is well aware of. It is, indeed, asserted by many, that bean-straw is as nourishing to horses as hay. Straw, it is true, is more difficult of mastication than long hay; but, were it chopped, we presume there would be little difference between it and chopped hay. It may be thought that horses could not undergo so hard labour on straw as on hay, but his own experience in post-horses, who do fast work, satisfies Captain Cheyne, that cart-horses could do a great deal of work on steamed potatoes, cut straw, and grain converted into meal. We have no doubt, that all farm work might be easily worked by horses on such a mixture, which could be made more or less nutritive by withholding or adding the grain according to the nature of the work to be performed on the farm. The trouble of the thing need be no obstruction to the introduction of this mode of feeding horses on farms. Any person will soon acquire the practice, and habit will render it as easy as any other piece of work. Besides, the great economy of the plan is a high recommendation to it; to every one who feels his capital daily lessening, and while the quantity of economical food is quite sufficient to maintain the power of the horse for labour, there exists no excuse but prejudice or indolence for the refusal of its immediate adoption. Think also of the advantage of not being obliged to make any hay on the farm. Hay-making is an expensive operation, and to be convinced that the crop of hay injures the soil almost as much as a crop of corn, we have only to observe the stinted state of the second and third year's sture, after the making of the first year's grass into hay. The

advantage would not merely be the saving of the whole hay which is given to the horses, as the value of it would be more than repaid by the value of the additional stock which could be kept on the pasture; but the succeeding years of pasturage would support either more stock, or the same number of cattle or sheep to a higher degree of perfection. In this mode, therefore, of preparing food for horses, hay may be dispensed with altogether.

The present mode of feeding farm-horses is to supply each horse daily, after the spring work commences, with 10 lb. of oats, $1\frac{1}{2}$ stone or 33 lb. of hay; whereas the mixture consists only of 6 lb. of barley-meal, or 8 lb. of oat and bean meal, without hay. The potatoes cannot be accounted of any value on a farm, and they are only given at night.

Suppose a farm-horse is fed three times a-day, his food may be thus divided:—

In the morning,	$3\frac{1}{2}$ lb.	oat and bean meal,
	$11\frac{1}{2}$ ...	chopped straw.
	15 lb.	
At midday, . .	3 lb.	oat and bean meal,
	12 ...	chopped straw.
	15 lb.	
And at night,	$1\frac{1}{2}$ lb.	oat and bean meal,
	2 ...	chopped straw,
	$11\frac{1}{2}$ ...	steamed potatoes.
	15 lb.	

These 45 lb. are quite sufficient for the strongest farm-horses.

Let the meal and chopped straw be put into a tub; let a little salt be sprinkled over them. Then let the potatoes, after they are steamed, be poured into the tub, and the whole mixture mashed together into a pulp. The weights of the respective articles, and of the mixture and mash, can easily be ascertained by measure. Captain Cheyne used to dissolve the salt in water, but the practice was disused for no particular reason, but probably because it was easier to sprinkle it in the crystallized form. Salt is only used in the mash at night. Some horses will eat the mash freely enough at first, others will shy at it for a night or two. Captain Cheyne recommends the mangers to be made of iron. When made of wood, the potatoes stick to the bottom,

and the horses are thereby induced to eat the wood. It is expedient to have four iron-bars across each manger, to prevent the horses tossing out the chopped straw and meal, which they are very apt to do at first, endeavouring to separate the grain from the straw; and this is more the case when the grain is only bruised and not ground. The bars are made of small round rod-iron, cut into proper lengths, and pointed at each end; one end left straight to drive into the back of the manger, the other is kneed to drive down upon the top.

DESCRIPTION OF A CURD-BREAKER FOR SKIM-MILK CHEESES.

THIS simple and efficient little machine deserves to be known in every district of a dairy country. Cheese-makers are aware of the labour required to break the curd in making skim-milk cheeses. We have heard of many curious expedients adopted by housewives, and some of them highly ludicrous, to facilitate the breaking of curd. This simple instrument is a happy substitute for every sort of expedient. With it any boy or girl can break the curd arising from the milk of eight or ten cows in fifteen minutes. It is not intended for the making of sweet-milk cheeses, the curd of which should be broken very gently. But as there is much more skim-milk than sweet-milk cheese made in the country, we think we confer a benefit on that class of cheese-makers, by making them acquainted with this simple contrivance which will save them much tiresome labour. It was invented by Mr Robert Barlas, Gilmour Place, Edinburgh, and has been in use on some farms for several years past.

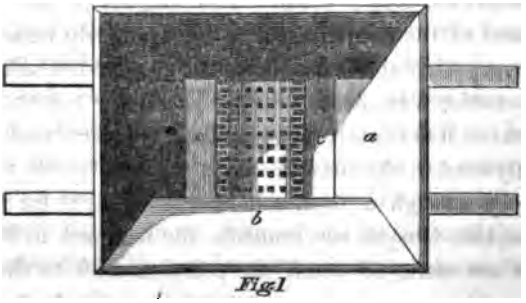


Fig 1

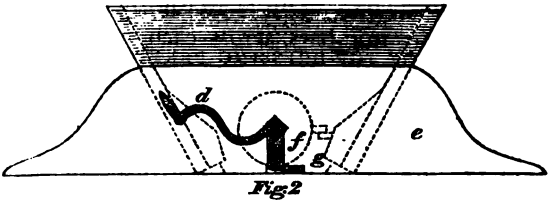


Fig 2

a, fig. 1., is a hopper of wood 17½ inches by 14 on the top and 10 inches in depth. *b* is a cylinder of hard wood 6¾ inches in length, and 3½ in diameter. It is studded with hard wood square pegs of a quarter of an inch in the side, cut square at the ends, and projecting three-eighths of an inch. There are eight teeth in the length, and fifteen in the circumference, of the cylinder, 120 teeth in all. It revolves on a round iron axle 12 inches in length, and is moved by the crank-handle *d* in fig. 2, *c c* are two wedge-shaped pieces of hard wood, made to fill up in some degree the space between the side of the hopper and the cylinder. These pieces rest on a slip of wood nailed to the lower rim of the hopper, to keep them in their place. The face of these is studded with nine teeth of hard wood, similar to those on the cylinder, in a horizontal position, but so placed as to embrace those of the cylinder at opposite sides. The stand *e*, fig. 2, can be made of any length, to suit the breadth of the tub into which the curd is broken. The implement is used in this manner: place it over a tub, heap the hopper *a* with curd, and turn the winch *d* in either direction, and the curd will fall quite small broken into the tub. While one hand is moving the machine, the other can press the curd gently down into the hopper. As cleanliness is a matter of the greatest importance in cheese-making, the internal parts of this machine being loosely put together, can easily be taken to pieces to clean. The cylinder axle rests on two hard wood plumber-blocks *f*, fig. 2, one on each side, which slip out of their groove. They are held in their working position by the thumb-catch *g*, sunk flush with the bottom of the stand *e*, one over each plumber-block. The wedge-shaped pieces *c c*, fig. 1, come out. To prevent the curd working out of the sides of the axle, the cylinder is set a little at both ends into the sides of the hopper. The dotted lines in fig. 2, will give an idea how the internal part of the machine is constructed. Only one tooth is represented on the cylinder by the dotted lines, to show the position of the whole.

ON A METHOD OF TOP-DRESSING PERMANENT PASTURE.

In many situations pasture is the best and most profitable mode of using land. In others it is the one most conducive to amenity, and the beauty of the house-grounds.

Nothing more thoroughly injures the productiveness of the soil, or more destroys the appearance of the lawn, than the tuftiness of grass produced by the droppings of the cattle depasturing on it; while, at the same time, no greater waste of manure can well be conceived, than ensues from these droppings being permitted to dry on the surface of the ground.

Farther, nothing is more important to grass-land, than the ability to give frequent top-dressings to the fields; and the fact is quite undoubted, that land used in permanent pasture is the only ground that cannot be made too rich. If, therefore, a means could be found to secure those benefits, and, at the same time, to remove these disadvantages, while yet the home-farm is not robbed of its manure, the advantages would be considerable, especially if employment for the poor, with benefit to them, and profit to the employer, were also to result from it.

The following plan has been pursued for three years with beneficial results:

Old women have been engaged to collect in baskets, latterly in wheel-barrows, the droppings of cattle in pasture-land, and to deposit the collections in heaps, at convenient stations in the fields, where the manure has been compounded with the earth previously laid down and prepared. When duly mixed, the compound has been laid down as a top-dressing on the same field. The result has been a great increase of fertility, while the whole fields have presented the equable and beautiful appearance of a lawn.

On the first institution of the experiment, the women were paid the usual wages of the country, viz. 8d. per day, and 2d. extra for every cart-load of manure which they collected. Experience shewed that, with ordinary diligence, they could collect nearly a cubic yard per day from horse-pasture; not quite so much from cow-pasture, and about two-thirds of a cubic yard from sheep-pasture; and, in consequence they contract to gather

and deposit in heaps, at about 11d. per cubic yard over head. From the speed and facility, they prefer horse-pasture. The labour is easy, and the process simple. They provide themselves with a light wheel-barrow; a couple of young boys or girls go with light spades across the field, and collect the droppings, according to convenience, in small heaps; the woman perambulates with the barrow to the most convenient points, and takes up and deposits the collection at the points assigned by the person in charge, generally at the margin, or in the corners of the fields.

At these stations earth has been previously prepared and laid down, from the scourings of ditches, parings of head-furrows, the furrows ploughed out (acting besides as useful drainage, where the land is damp, and in ridges), or other sources. A bed of this earth is prepared six or eight inches deep, on which the collections are laid, so that any drainage from the manure may be absorbed by it; and as soon as the collection deposited is measured, and noted by the person in charge, it is carefully covered up with more earth; the sooner this is done the better.

The quantity of earth used ought to depend on its quality. Four cubic yards to the cubic yard of the collection has been found to produce rich and powerful top-dressing. In many situations five may be used with safety; in others three will be more expedient. If each cubic yard be allowed to cost 2d., then, on the average of four to one, the cost will be 8d. for the earth and 11d. for the manure; and the proceeds being five cubic yards, the cost is under 4d. per yard for a rich compound laid down in the field in which it is to be used.

The plan followed has been to commence at one side of the field, and to dress at the rate of 15 to 18 cubic yards per acre, as far as the compound will go, to commence next year, where the former year's process stopt, and so on; and in ordinary pastures, the calculation in 1831 was, that a field would be gone over every second or third year. But the account having been kept separate for each field this last season, there is reason to think that this estimate is too low; in some rich fields there having been gathered betwixt four and five cubic yards of ma-

nure from each acre of grass; a quantity that would give a rich dressing to the whole field annually.

Should the ground become too rich, of which there is not much danger, there is little reason to doubt that, in most home-farms, the extra manure collected would be joyfully received by the steward.

It has not been found that the reservation of liberty to proceed with this operation, in the least degree affects the rents of grass-lands let annually for pasture by public auction.

There is reason to believe that at least one benefit accrues incidentally from this process, viz. that by the removal of these droppings, the fly from whence the oat-grub proceeds is prevented from depositing its eggs in the place prescribed by its instinct; and that thus, when it may become necessary to break up the field, and to sow it in oats, the danger of loss from this cause is prevented, or at least diminished.

The continued succession of top-dressings which pasture-land may be thus made to provide for itself, cannot but have the effect of keeping down the accumulation of fog or moss, so injurious to permanent pasture on inferior soils. The effect of these top-dressings must be to diminish, if not altogether to extirpate, the fog, and thereby prevent the necessity which often exists for breaking up lands for tillage, which it would otherwise be desirable to retain in pasture.

W. B.

ON IRISH LANDLORDS.

NOTWITHSTANDING all that has been urged from time to time against the land proprietary of Ireland, the fact is, that it is an improving class, and, in numberless instances, generous and honourable, considering the difficulties in which a large portion of it is involved from hereditary incumbrances, and a desire to live above its real resources.

There are many great estates extremely well managed. Those of the Duke of Devonshire, the Marquis of Downshire, and Earl Fitzwilliam, for example, on which a system of accurate

and minute superintendence has been established through the instrumentality of admirable agents; and on a smaller scale, though still on a large and aristocratic one, proprietors like Colonel Conolly (one of the present representatives in Parliament for the county of Donegal), are to be found devoting their time and resources to the improvement of their properties, and the welfare of their tenants, free from pride and ostentation, and exhibiting examples of all that is good in morals, and excellent in husbandry, as well to their own tenantry, as to the minor gentry around them.

Still, on many portions of the most improved estates in Ireland, as their proprietors well know, the deficiencies of agricultural practice are very obvious indeed, when contrasted with the perfection of Scotch husbandry and Scotch management, in the improved districts of North Britain.

Among these, we may rank principally the want of a *green crop system*, and the decided disinclination of the land occupants to depart from the old and beaten track of those who were before them.

As a necessary result of this indisposition to cultivate artificial grasses and green crops for cattle feeding, the cleanliness of the land is neglected. No trim hedges are to be met with, nor regularity and neatness to be observed upon the farms of the humbler class. Indeed, in many districts, furze hedges exclusively prevail; where other fuel is scarce, they supply the hearths with faggots, and being usually devoted to this purpose, are never submitted to the shears;—they consequently present a straggling and neglected appearance, an air of artificial wildness, which to a neat farmer is intolerable.

The leading principles, however, by which Irish landlords of the first and best class seem to be influenced in the management of their properties, are such as effectually promote their own interests, as well as those of their tenantry. In the first place, they set their lands at a reasonable rate, on an equitable valuation, and instead of looking for the highest bidder, would not *accept a greater rent were it offered to them.* They wisely consider that their own interests are involved in those of their tenants, and they lead those tenants to a practical

acknowledgment of the fact, that they reciprocally depend on each other. In adverse seasons they are able and willing to make reasonable abatements in their rents, and never press severely. They afford facilities for manuring; construct lime-kilns, make roads, form quays and embankments on estuaries or navigable rivers, for the landing of coals and culm, the exportation of corn, butter, and cattle, and frequently build excellent houses for their tenantry. Being great capitalists, they can afford to expend large portions of their rents in making permanent improvements,—the bridge of Dungarvan, for example, which cost the Duke of Devonshire L. 16,000. Such landlords, aware of the importance of a minute superintendence of their estates, take especial care to appoint agents of the highest respectability and talents, who are fit representatives of their absentee principals,—gentlemen in every sense of the term, whose presence is welcomed with respect by the affluent farmer, and hailed with gratitude at every cottage.

There are, however, numberless other landowners possessing Irish and British estates, who are not so careful to find proper substitutes, or equally ready to make amends to the Irish community for their absence, who employ mere *receivers*,—men of pounds, shillings and pence, equally indifferent to the real interests of their employers, and of the tenants committed to their care; who estimate their trusts merely by the standard of the per-centage which they receive, who regularly call for the rents (to be *transmitted* to London or to Paris), but seldom or never inspect, as they ought to do, the estates over which they preside, and are indeed rarely authorised, even were they so disposed, to act in any other manner.

There are, it is to be lamented, some Irish landlords, high in rank, but proportionably low in the scale of moral and patriotic excellence, who absent themselves altogether from their country, who with the greatest exactness draw the last shilling from their exhausted and overcharged tenantry, who in seasons of scarcity and distress contribute little or nothing to the local exigencies of the poor, but withhold the hand of charity altogether, or extend it with a feeble and penurious effort, who leave the support of their own poor—the poor who have multiplied on these estates,

from which the absentee possessor would now gladly evict them, in the helplessness and destitution to which they have been reduced, in consequence of the apathy and maladministration of their landlords, aided by the political manœuvres of them or their predecessors, under the old forty-shilling freehold system, the bane of all good order and morality.

These heartless men, from never witnessing the condition of their miserable serfs, feel no compunction at their situation, but, to supply the wants of their fashionable establishments in fashionable places, draw to the last shilling on their agents, and think that the contribution of a few guineas in the year to a dispensary or a school, is a most liberal return for the rents which they abstract, leaving the employment and the maintenance of their paupers to others less wealthy, but more compassionate.

It is deeply to be lamented that the Irish peasantry have for some time past themselves, given fair pretext to the *bad* landlord for his absence and indifference to their interests, and at the same time afforded ample subject to the good one for disgust—for abandonment of his home, of his improvements, of his schools,—of every thing calculated to elevate the people from their degradation. We can instance some of the kindest, the most devoted, the most *improving*, and wealthiest of the Irish gentry, whom the waves of domestic agitation, raised by demons for their own desperate purposes, have driven within a short time from the estates where their presence was a blessing, and have left their demesnes solitary and untrodden,—the sad evidence of desertion by those whose cheering presence, did not the spirit of discord prevail, would have continued to impart joy and animation to the scene.

By this unnatural separation of landlord and tenant, effected through the detestable agency of fiends, who are alike the deliberate and intentional enemies of both, the social duties are abandoned, and their connecting links, on which depend the very existence of civil life, are broken asunder.

From this desertion, increased as it will be, unl Providence shall speak peace to this distracted and ill-gover country, incalculable evils arise. Into hands less powerful i l influ tial, are now, and still more will be delegated, the

trust; and those many duties which can only be discharged with efficacy by those who, having a deep interest in the stability of property, must be interested in the maintenance of civil order, and in supporting their own high influence, to which the Irish peasant (ever ready to resist the law which he feels has not uniformly interfered for his protection) will always bend, rather than to any secondary or delegated power.

There never was a period in which landlords, whether Irish or British, have been more loudly called on to discharge their reciprocal obligations than at the present day;—when an almost universal spirit of dissatisfaction prevails among the lower orders, who, jealous of aristocratic influence and power, would degrade if they could, to their own level, those whom birth or fortune has elevated above them.

Nor is this disposition to be treated slightingly or without alarm. The extremes of wealth and voluptuousness on the one hand, and of indigence and suffering on the other, are painfully opposed. The working classes, especially in Ireland, are in many instances insufficiently fed and clad, while the progress of education and the diffusion of knowledge must teach them to feel and know the extent of their degradation.

War against property has commenced,—the attack upon tithes the first, which the Ministerial Generals have rendered a successful movement, is but the opening of a more spreading warfare. The object is to equalize property, and absurd as this principle may be, when the combined energies of some millions of men in distress are considered, the probability of an active and practical demonstration is to be apprehended and guarded against by the prudent and liberal conduct of landowners and capitalists, who, one and all, should make considerable and timely sacrifices to promote the comforts of the lower orders.

The monopoly of wealth, by a few comparatively, may be diminished by legislative interference, and overgrown possessions trimmed down by a property-tax to a more proportioned stature. But the great point of giving employment to the agricultural classes, and of bettering *their* condition, must be effected through the land-proprietors themselves, who, if they be not willing, should be compelled to contribute to the relief

of the poor on their estates, in such a way as to produce effectual and permanent good. The absentees from Ireland, in particular, might perhaps advantageously be subjected to large deductions of their rentals; and, in cases of estates held by the possessors of property in England, where they reside, the power, nay the obligation, might be conceded, of cutting off the entail, in order to make way for a younger son, who would reside on the Irish estate. The proprietors of estates so circumstanced might also, with the consent of the persons immediately to succeed, or, in case of minorities, with the approbation of the House of Lords, or some other competent court, be empowered to sell the Irish property, and transfer the proceeds to Great Britain for the same uses, and, previously to sale (until opportunities for purchasing should occur), to vest it in some fixed securities, for the advantage of the heirs. I repeat, that the attack upon landed property in Ireland has commenced, and next to the indifference, or supineness, or *manœuvring*, or whatever else it may be termed, on the part of Government, the success of the peasantry of that country, in their combined efforts against the payment of tithe-rents to the clergy, is attributable in a great degree to the conduct of the Irish landlords, who, in numberless cases, have looked on the opposing movements with indifference, frequently with concealed pleasure, and without any active effort to break down the force and energies of their confederated tenantry, which they could have done in numberless instances, either by paying the clergyman and charging the amount of his fair and legal claim, to the accounts of their misguided landholders on their respective estates, or by boldly distraining for the clergyman.

But they have not done so, they laughed in their sleeves at the perplexities of the parson, and while they expressed regret at the refusal of their tenants to pay, they civilly declined any interference, which they declared to be unavailing, and hoped that the *Government would soon* make some satisfactory arrangement, while the Government itself was giving ample time for the organization of effectual and successful resistance.

But to return to the consideration of the principles by which Irish landlords of the first and best class are guided.

After setting their lands on moderate rents, and having pro-

bably experienced the evils of an undertenantry, they guard against the location of any new and unauthorized settlers by strict covenants, and, still better, by a rigid and minute system of *surveillance*. On some estates, however extensive, it is impossible for even a temporary settlement to be made, without the knowledge of the agent. The Marquis of Downshire has every house on his various properties regularly registered and numbered, so that any new occupant would be detected by the smoke of his chimney.

Every one acquainted with Ireland knows that the practice of underletting land has been a fruitful source of evil, and that there are few estates which are altogether free from unproductive and encumbering intruders.

Humane landlords, instead of oppressing these poor persons, and evicting them on the first opportunities, have either supplied them liberally with the means of emigrating (at their own desire), or improved their condition at home, by increasing their allotments of land, dressing up their cabins, and providing employment for them.

Some properties, greatly peopled in proportion to their extent (that of Bannow, in the county of Wexford, for example), have been enabled, by judicious management, to maintain their occupants in comparative comfort and independence; and where a desire for emigration to America has been expressed, the funds for going thither have been largely supplied, not merely sums sufficient to land the exile on the shores of the far country of his choice, without the means of proceeding to the advantageous points of settlement, without provision against sickness and the various casualties which may await him before he succeeds in obtaining a desirable location; but since policy has pointed out emigration as a desirable mode of relieving an overwhelmed soil, so the influence of humanity has operated on every good [illegible] landlord to provide the supply of *ample* means.

[illegible] one landlord has provided suitable cottages, with gardens attached, and systematically employed the *cottiers* as day-labourers on the general improvements of his land, in planting, draining, road-making, &c. he has not been a loser by leaving on the spot of his birth (to which the Irishman clings with tenacity) the peasant whom he finds there: and whether he be

the advocate for large farms or for small ones, for husbandry on a great or a minute scale, being such a man as we alluded to, he will not forcibly extinguish, in the huts of the industrious poor, the fires which have long burned on their hearths, merely for the crime *of multiplication* and the *misdemeanour* of a love of offspring, which has induced them to share their last perch of ground with an increasing progeny. * While any feasible method appears of keeping these wretched beings on their estates, the class of landlords under consideration cannot bring themselves to evict those wretched beings who, with tacit permission, if not with positive encouragement, lived and multiplied upon their property, but will sacrifice to them some minor lots in contiguous and retired compartments, and thus neutralize the inconveniences arising from their occupancy in distinct and prominent situations.

Indeed, there are many circumstances which render the establishment of small hamlets desirable for the execution of those agricultural works which an enterprizing proprietor will undertake. The location of poor tenants will afford an additional and *ready* force of necessary labour; and those villages, if built with judgment, may be rendered not only commodious, but highly ornamental, presenting an appearance like that of the village of *Pilltown* on the estate of Lord Besborough, with a wide street, gardens in front as well as in the rear of the houses, and filled with shrubs, flowers, and kitchen vegetables, and sufficiently detached from each other to avoid the danger of fire.

Besides, when the range of buildings is interrupted, the occupants are less likely to enter into scenes of conflict and disagreement, which so frequently occur from contiguity of dwellings, and still more from placing two families in one house, in which case the members of the neighbouring households, from the women at their head to the poultry before their doors, have all the opportunities of *cantankerous* excitement from their near vicinity.

By a system of exact *superintendence*, and the stimulus of an annual distribution of small premiums for cottage neatness, the houses are not suffered to run into decay, nor is the whisky-house

* See Hints to Landlords, by Martin Doyle, p. 61, *et passim*.

(the sure indication of idle and dissolute habits) allowed to shew its unhallowed front. And in villages of limited extent, the particular circumstances of every family can be known to the agent or his employer, as the concealment of improprieties would be difficult.

With two or even one acre attached to each house, and moderately charged, the landlord has a happy and contented tenantry, instead of a set of starving paupers, paying rack-rents to a middleman for hovels and potato-ground not half manured or adequately litted.

A cow is of course necessary to the comforts of each family, and to the accumulation of manure.

Colonel Conolly gives great encouragement for attendance at the many schools which he has established on his property (in the number of which he is second only to the Marquis of Downshire, who has thirty-six schools on his extensive estates), and grants premiums, amounting to fifty shillings a-year, to "each of those widows who have paid rent for ten years, and brought up their families decently and respectably, having their children educated, so that those *above ten* years shall have acquired a competent knowledge of writing and arithmetic, and those *above eight* shall have made suitable progress in reading, and those *under six* shall have made a reasonable proficiency for their age."

This excellent gentleman, and other judicious persons of the same class and circumstances, frequently provide good seed corn from distant soils, and clover and grass seeds, to induce the green crop system; many an humble farmer being intelligent enough to estimate the value of artificial grasses, but without the means of procuring them.

Such landlords, but alas! they do not form the majority of the proprietors, exert themselves also to have their objects and principles perfectly apprehended by their tenantry, and while they study the characters, dispositions, and circumstances of their dependents, suit their own conduct and motives, as much as possible, to their observations, in order to shew how very much their interests are blended together.

Every prudent landlord, solicitous to prove that he is not influenced by caprice or whim, takes care to evince deliberation

on his part, before he commences any work, or even grants any request.

The want of a fixed rule of conduct always leads to bad results; plans *hastily* adopted are *soon* abandoned; one tenant is pardoned for an offence or act of negligence to-day, and another is visited to-morrow with displeasure for the same or a similar fault; and in consequence, the landlord obtains (and very justly) a character for unsteadiness or partiality, and the tenant, having no fixed guide to follow, becomes wavering and perplexed.

The owner, or the superintendant of an estate, should be easy of access, and ready to listen to every reasonable request or complaint:—this is an essential point of character. He should not decide a case without hearing both sides; and as a consequence, he will find that falsehoods will seldom be told to him, for his tenants will soon learn that a liar forfeits his esteem and protection altogether.

He does not exhibit symptoms of prejudice, and therefore will have the gratification of finding the parties satisfied with his adjudications, because they proceed from a steady principle, which they are taught to understand. Landlords of this description, though they may find it advisable in general to have a fixed time for payment of rents, and not to take fractional parts, always consider the state of the markets; for it is inconceivable how greatly a farmer may be served, by being allowed even an additional fortnight for payment, the circumstances of the market, as to the prices of corn, butter, &c. being of material moment. Extreme punctuality, however, is to be recommended as a general rule, advantageous both to landlord and tenant; as the writer of this article knows to be the case, from having remarked its good effects in many instances, especially upon the estate of Mr Bayse at Bannow, in the county of Wexford.

A thorough knowledge of the peculiar wants and interests of individual tenants is also desirable (and practically acquired on the well managed estates referred to), in order that loans, or gifts, if necessary, may be supplied. For instance; if the keeper of a small farm, favourably situated, should be led to dress it up, and enlarge it, he may require, and it will be the landlord's

interest to grant, an advance of money, or indulgence as to the period of rent-payment;—or, a man who could let lodgings by the sea-side, might, perhaps, with a small advance of money, be enabled to extend and improve his accommodations, and repay the sum lent in a year or two.

By granting judicious loans, according to circumstances, from six months to two years, a landlord possessing capital (not frequently to be reckoned on in Ireland) may enable his tenants to become, not merely solvent, but comparatively wealthy. The timely purchase of a horse or a cow, has often restored a sinking family, without the loss of a shilling to the lender.

It is the interest of the landlord to prevent a deserving tenant from falling into a state of poverty; and calamities, or their consequences, may be either avoided or mitigated by prompt and timely attention;—suppose, by supplying a tenant with seed to crop his land, and by taking it in kind in the ensuing harvest.

The worst of the case, in Ireland, is, that the landlords, generally speaking, do not advance any capital whatever to the tenant, nor even build or repair his houses: on the contrary, if the tenant possess any capital, on coming into occupancy, the needy squire *borrows* it from him, *by way of security* for future rent, and thus deprives him of the means of improving his farm; and if he do *not* grasp it in his clutches, he charges such immoderate rent for dilapidated buildings, and worn-out ill-fenced fields (from the want of proper covenants with the outgoing tenant, as to the course of cropping and manuring, &c.), that the capital soon disappears, and is never reaccumulated.

An English or Scotch tenant, if the buildings on his farm be insufficient or out of order, is allowed a sufficient sum by the landlord to build anew, or to repair them; he finds his fields correctly divided, and in every respect prepared for the ordinary routine of husbandry; and these essential variations between the practices of British and Irish proprietors, is sufficient to account for the difference of rent, which is certainly lower in Ireland.

This may be further accounted for, by the natural productiveness of the soil being worn out by a long course of bad tillage and excessive cropping,—by inability in the recent occu-

pier to supply manure,—all being combined with ignorance and mismanagement. The *cottier*, however, is exorbitantly charged. Labour, also, though nominally much cheaper in Ireland, is not always really so: an ill-fed man, such as the Irish labourer, can neither work so steadily nor so vigorously as a well-fed Englishman or Scotsman: he is also an idler, and must always be under his master's eye; and, though his occasional exertions be great, and his patience and good humour amidst grievous privations inexhaustible, he is a more costly servant than may at first be imagined.

There are various minute ways in which the considerate and independent landlords of Ireland promote the interests of their tenantry, to be acquired only by practice, and acquaintance with the national character. Take the following particulars.

A tenant comes into possession (we refer to a period antecedent to the Whitefeet system) with the good will of his new neighbours, and under the favourable consideration of his landlord. Let the proprietor but give the slightest intimation of his wishes, and the *neighbours*, who estimate their own labour as nothing, except in the spring or harvest, will readily contribute a day's work, or lend their carts, ploughs and horses, to put out manure, or to sow a crop; and, of course, the landlord himself will lead the van in this labour of kindness and utility. Nor can he do himself, his tenantry, or the country at large, a much greater service, than by exercising in his own person, or by calling forth in others, that interchange of good feelings, which so materially tends to the moral improvement of the community.

The circumstances of land-letting in Great Britain and Ireland differ extremely in many particulars, and most unfavourably as to the latter country. The landlord, in the former, builds the farm-houses, and keeps them in repair. The tenant, on taking possession, has usually little more to do than to follow a certain routine of husbandry on fields in *good heart*, previously drained, fenced, and otherwise in good order.

In Ireland, as we have already hinted, the tenant has frequently to build, and almost to repair his own houses, to enclose, manure, &c. by which preliminary labours he exhausts his capital.

If the landlord, therefore, be devoid of capital himself (a

common case among the petty proprietors, who are the worst of all landlords in every particular), he finds it his advantage to furnish such *materials* as his estate supplies, lime, slates, timber, and, if practicable, a *little* money.

The tenants themselves will, with a given sum, or a given quantity of materials, continue to have more work executed, and in a better way, too, than if the landlord were to contract for buildings according to his own designs. The principle of enabling tenants, (and it is that of one of those excellent proprietors I have named), to advance their own interests, and improve their own condition, is far better than the plan of leaving the entire management to the landlord, and for these reasons:

The same sum of money goes farther when expended by the thrifty tenant, his industry is called forth, he prefers his own plans to those of any other person, and is more careful to preserve his own work.

If he himself make the outlay, and improve considerably, the landlord should mark his approbation, by diminishing the rent considerably, and he should still have every facility given to him as to the application of manures, the planting of trees, thorn-quicks, &c. The landlord's system should be to stimulate the industry, and improve the resources, of his tenantry, to make them *parties* in whatever is executed, to make them feel their own powers of assisting *themselves*, by individual and collective effort.

Is a hill to be cut down? A school-house to be built? A road to be repaired? The bed of a river to be lowered? Let them see that they are themselves capable of accomplishing what they had conceived to be out of their power, and when they find that the care and attention of their landlord are judiciously applied to the promotion of their welfare, they not only readily combine their efforts with his, but feel grateful when they practically learn the value of his suggestions. That scientific farmers, if they could be had, with cattle and implements, and suitable capital, would be more advantageous to the interests of the landowner, than the class of small holders or labourers alluded to, even with all the advantages of spade husbandry, is indisputable; and it cannot be expected that any proprietor should volunteer to cut up his fields into portions, for the ac-

commodation of pauper small holders, if they had not been previously in occupation of his land. The advantages derivable from minute husbandry, though producing by superior tilth a greater quantity of food, cannot counterbalance the inconveniences of subdivision. But on those estates on which the paupers *do exist already*, the case is far different, and if not transferred to the colonies, with their own concurrence, and with provision for their maintenance there, until a reasonable time shall have rendered them independent, the landlords ought to appropriate adequate portions of their estates to their support, at the same time giving them every facility of bettering their condition, and for the rest, making their comforts to depend entirely on their own exertions.

If the landlords of Ireland do not themselves volunteer some arrangement for the maintenance of their poor, they will at length be compelled to do so by the temper and circumstances of the times. The working population is alarmingly great, and mischievously made aware of its physical powers in a contest with the higher orders;—their state has been too long trifled with.

The Government are at this moment evidently contemplating some system of poor-laws for Ireland; the causes and necessities for which are unfortunately attributable to her own proprietary, to the old forty shilling freehold system, to absenteeism, to lavish and thoughtless prodigality, to forgetfulness of the social duties, and of the awful responsibility attached to those landlords, who, instead of being faithful stewards of the talents committed to their trust, have abused the temporal advantages which they have possessed, wasted in their own selfish pursuits all those means with which Providence has blessed them, and trifled away the existence which was given to them for the noblest purposes.

Even with the sad catalogue of Irish crime before us, with the most appalling evidences of fiendish ferocity, of irreligion and immorality, they do not think that the Irish peasantry are incapable of being rendered a noble, generous, and excellent people; their extreme *tractability* renders them fit subjects for moral influence, if that influence could be freely exerted; but now what individual will strike out the means of employment

for a population instructed and led to turn even his good deeds, and kindness, into ridicule and reproach? Who will exhaust for a seemingly ungrateful tenantry, those resources which he may require for his own independence in a foreign land? If the country be not subjected to law and discipline, who that may avoid it can be expected to remain at home? But should that happy day arrive when agitation having expired, returning peace and order should establish the reciprocal interests and duties of the rich and poor,—the extreme tractability of the latter, now a dangerous weapon in the hands of the ambitious and designing, would become the instrument of moral influence with their natural patrons and guardians, who would be prompted by every motive of interest and inclination to exert themselves for their welfare and improvement.

There is one probable and obviously desirable result which may follow from the recent conduct of the Irish peasantry in many districts,—a mixture of the English and Scots peasantry on Irish soil.

The number of Irish labourers annually drafted into England appears to be very great, and be it remembered, that that portion of the Irish community is the worst possible specimen, shoeless, shirtless, breechless, bog-trotters from the wilds of the western coast, to whom English food and wages in the harvest season are luxury and wealth. These poor people are bettering their condition materially by the exchange of country, and are an useful class to the English farmer. The more educated and better clad peasantry of the eastern coast of Ireland rarely visit the British shores; they are occupied at home in districts where food and wages are better and more permanently supplied than on the western side; and if seen in England, would at once be recognised as the elite of the Irish labourers; the other portion already known there, is a very inferior class of the population, having at present (unfortunately for the pride of Ireland) the reputation of being the fairest sample of Hibernian industry.

An interchange and admixture of the peasantry would effect much good; the poor laws of England have ruined the English pauper. If located on some of the waste lands of Ireland, he might become an useful and active member of the community; and some of the Irish poor, if placed in the agricultural districts

of England, where the farmers find their services valuable, and where, if relieved from the heavy pressure of poor rates, they would gladly employ them, would become a very improved class. Landlords can effect much in this way.

As bearing on our present subject, the admirable testimony of Mr Joseph Little, agent of the Lead Company at Durham, may be adduced. This gentleman adds with true dignity, "that he had the peculiar advantage of having been a labourer himself till he was twenty years of age." He had the management of several hundreds of labourers for twenty-five years. "I assume it as certain, (he observes) that no man will work *hard* without the *hope* of thereby bettering his circumstances, and also that without such *hope*, there is no hold upon the labouring classes. I may in proof refer to the apparently anomalous circumstance, that the Irish labourer without poor laws, and the labourer of the south of England under a lax administration of them, seem to be in the same moral condition, which I ascribe to the want of *the all-moving stimulus of hope*; they are so situated that neither can look to improve their condition by any exertion or good conduct of their own; and becoming reckless and degraded in feeling, they give a loose to their appetites and passions, without thinking of consequences; hence, indolence, habits of dissipation, improvident marriages, turbulence and crime, every thing, in short, which leads to misery and pauperism."

The landlords of Ireland have hitherto been free from taxation of their land for the support of the poor, and have consequently drawn heavier rents than persons of the same class in England have derived from their estates. Let them exert themselves now, to provide steady employment for the working classes, else they will assuredly be taxed,—and deservedly so. Employment *must* be afforded through some instrumentality; the waste or half cultivated tracts of Irish property, amounting to five millions of acres, afford an obvious resource. How large a portion might be planted with trees, which is now unprofitable to the possessor! How much might be rendered productive by draining and enclosing! *Employment* is the *grand desideratum.* Those who are actively and profitably occupied, have neither time nor inclination for concocting or practising mischief. The risings in Kent had their origin in want of labour; the hop gardens fail-

ed in 1830; labourers were consequently thrown out of employment; thrashing machines were attacked, combinations formed, and the events at Paris at that time were, to the disaffected, tempting suggestions, that they had the power of remedying their own grievances.

No one should be maintained in idleness, if able to work; he should be made to depend on his own resources, and to be subject to privation on proofs of misconduct; and this work can be found,—remunerating productive work, if landlords will exert themselves to afford it. To adduce one instance of the judicious application of a landowner's capital, the gentleman who has the control and management of Lord Fitzwilliams' Irish property, was anxious, two years ago, to employ some hundreds of labourers. A piece of uneven swampy land, from which turf had been formerly cut out, presented, in the neighbourhood of the demesne, at Coslotin Park, in the County of Wicklow, a very disagreeable appearance, besides being almost utterly useless for any purpose of vegetation. The whole of this portion (some acres) was trenched three or four feet deep, care being taken to keep the best parts of the soil for the surface. It was carefully drained; levelled with a machine resembling the Flemish mouldebaert, limed, and then manured plentifully from the farm yard, for potatoes and turnips. The operation cost L. 25 per acre; but the two first crops, which were enormous (potatoes and turnips, succeeded by oats and grass seeds) paid for the outlay; and what was an unsightly and useless appendage to the demesne, is now rendered an enclosed portion of it, and is covered with verdure. Thus was labour, applied from the mere motive of supporting a considerable number of poor families, turned to a really profitable account. Gratuitous donations effect no permanent good: nor does labour, as applied in England under the poor-law system, produce any good results, either to the labourer or to the person compelled to employ him. There is no *stimulus to industry.* The person who is neither able nor willing to work is sure of maintenance. The idle, the profligate, who have spent their earnings when work was abundant, have unfortunately a *legal right* to parish support, and claim it steadily. The wives of these paupers are dirty and indolent, their children neglected, vagrant and immoral; while in the

cottage of the independent labourer, the wife is a model of tidiness, her house neat, her children clean.

The improvidence of the Irish poor has been always matter of observation and regret. This character, however, is not peculiar to them; the operation of the poor laws has produced the same sad result in England. Has a man saved money by honest industry, and afterwards lost his health and service? As long as he has a farthing left, the parish overseer will not afford him parochial aid to the same extent in which he relieves an idle scoundrel, who never saved a shilling, though he had it in his power. Here is a false principle with a vengeance, and direct encouragement to spend and not to save. Again, a young man marries without having a shilling; he speculates on parish aid; he knows that an unemployed or idle man with a family is better off than a single one; he has a certain allowance for his wife and each of his children. Here is removed a check to early and improvident marriages. Pat, when he can hardly pay the priest, marries from love and thoughtlessness—John, from interest—which of them is the more blameable?

To conclude, under existing circumstances, we would recommend the trial of cottage husbandry to the adoption of Irish landlords.

Much might be done in this way for the relief of the industrious poor; and surely, after the aged and infirm, they are the chief class to be considered.

In Ireland particularly, where habits of frugality and privation are from dire necessity so prevalent, the small quantity of land necessary for the support of a family would surprise, and, in proportion to the facility of manure, the extent of the cottage farm might be reduced. A small vegetable garden, one acre of *well cultivated* potatoes, with one of oats alternately, a small clover plot, with portions of rape and mangel-wurzel, would be ample for the supply of parents, children, cow, pigs, poultry, and donkey, and would leave a sufficient rent for the landlord,—the good and kind-hearted landlord, who might thus, by degrees, establish a grateful and improving tenantry, advancing them, according to merit, by regular gradation, to holders of increased extent, and circumstances of growing respectability and influence.

Thus, might this fertile island, famed for its agricultural resources, become a scene of remunerating industry, instead of contentious broil, (God grant that we may ever see it). Look to it you who are still possessors of the soil, your individual interests are deeply involved, and interwoven with those of the farming and labouring classes, and of course of the community at large. D.

ON THE AGRICULTURAL EXHIBITION AT STIRLING.

THE unpretending *brochure** just published by Messrs Drummond, deserves notice, not only on its own account in giving the details of an interesting exhibition of agricultural plants and seeds, which they have instituted annually at Stirling, with judgment and good taste, but also on account of the many very interesting facts which it contains in regard to agricultural produce and practice. At this period it is quite unnecessary to demonstrate the advantages arising from agricultural exhibitions. Their frequent occurrence in every part of the kingdom fully establishes the opinion of agriculturists in regard to their utility. But the agricultural exhibition of Messrs Drummond, in presenting a new feature in a subject which may be thought incapable of exhibiting a varied aspect, attracts an unusual attention. Agricultural exhibitions generally last only a day, because the live stock which are exhibited at all of them demanding a supply of food which cannot always be conveniently obtained, prevents their attaining a longer duration. On the other hand, in the kind of exhibition instituted by Messrs Drummond, the materials of which it is composed no longer requiring nourishment from the soil, can be exhibited for a considerable time without loss to themselves or their exhibitors. There every sort of agricultural root, seed, and plants, and even implements of husbandry, may remain tastefully arranged, under cover, and appropriately labelled. These are sent from all parts of the country, every ex-

* Report of the Agricultural Exhibition at Stirling, at the premises of Drummond and Sons, from November 16. 1832, till March 16. 1833.

hibitor no doubt thinking, when he sends his quota, that it will be the best of its kind at the exhibition, till comparison establishes the correctness, or reproves the error, of his secure confidence. The exhibition being held under cover, the articles are protected from the effects of the weather; and continuing for four months, a crowd of people is not necessarily collected at one time, which crowd frequently interrupts the enjoyment of, and distracts the attention from, a calm and leisurely survey of the articles exhibited. The value of the exhibition is thus destroyed to many spectators. A protracted exhibition is not only enjoyed by the agriculturists who go on purpose to view it, and who feel a professional interest in every exhibition of the kind, whether it be of long or short duration; but it enables any visitor, sojourner, or passing traveller through the place in which it is held, to enjoy a sight of unfrequent recurrence to them. The exhibition will commence this year in October, when the Highland Society of Scotland will hold their great annual show of live stock in Stirling. This event will open the exhibition with eclat; and we have no doubt, that, in consequence, the Messrs Drummond will make their preparations commensurate with the occasion.

Some very interesting experiments were made by Messrs Drummond with some of the roots which were exhibited, in order to show their comparative value in field culture. Those with the turnip were particularly so. In order to establish a standard of density among turnips, they were immersed in water, and the quantity of water which they displaced being noted, they were then weighed. By this treatment, the green-top Yellow indicated a bulk of 32 cubic inches to the pound, and which was taken as a medium density. Dividing the volume of water displaced by each of kind of turnip by 32, the remainder being halved for sixteenths or ounces, the quotient will show the pounds and ounces which it ought to weigh to be of standard density. The actual weight of the root will then show whether the kind weighed is above or below that standard. We have thus a very simple scale, which affords a just criterion of value, and at the same time a correct idea of size.

In this manner the following trials made on turnips, selected from different soils, and of various weights, including two of the heaviest of each kind, gave of the

					lb.	oz.	Actual Weight.	
Swedish, in	6 trials, an average standard weight of,				8	0	9	13
Green-top yellow,	5	...	...	...	13	3	11	13
Red-top yellow,	4	...	...	...	10	6	10	13
Dale's hybrid,	4	...	...	...	11	0	10	1
White globe,	6	...	...	...	14	7	12	2
Red-top white,	4	...	...	...	13	4	11	4
Green-top white,	2	...	...	...	11	8	10	13
White tankard,	1	...	...	...	16	14	14	0
Purple Tankard,	1	...	...	...	12	10	11	8

The Swedish turnip thus stands pre-eminent in regard to density, and, contrary to all others, the largest is always the most solid. According to the experiments of Mr Sinclair at Woburn, the nutritive matter afforded by the largest sized Swedish turnip, in proportion to the small, is as 110 to 99. One pound of Swedish turnips, or 7000 grains, yields 440 grains of nutritive matter. The Swedish, then, under every species of trial, is the best feeding turnip. Our astonishment is therefore great, that it is not more cultivated to the north of the Forth than it is. It is a great error to assert that the Swedish turnip will not grow well on light hazel soils. We know they will yield a most valuable crop on such soils, provided they are properly cultivated. Clean land, plenty of rotten dung, and early sowing (before the 15th May), will certainly insure a good crop of them. Swedish turnip are invaluable for feeding late in spring, till the grass is sufficiently grown to feed cattle. Removed even to a distance from large towns, they are intrinsically the most valuable crop of turnip. We remember of seeing, some years ago, an extraordinary crop of them in a field of fifty imperial acres, on the estate of Wedderburn, in Berwickshire. They were raised without dung, after oats, which had been sown on a lea that had remained a permanent pasture for forty years. The roots were very large over the whole field, and as close together as they could grow. One-half of them was stripped off to feed cattle, the other half was eaten off the ground with sheep. This latter half was stocked with Cheviot wedders, which paid sixpence per head per week. At this price, the field paid at the rate of twenty guineas per acre. There is one peculiarity in the feeding properties of the Swedish turnip which deserves attention. It is observed that if hoggs, that is young sheep, are kept too long on them in spring, they die of the

disease called pining. This effect probably arises from the astringency of this root.

The red-top Yellow stands next in solidity to the Swedish. This turnip, it seems, is considered a good one, but it falls off in its feeding quality, on light soils, if it exceeds the weight of 10 lb. Messrs Drummond were informed that this turnip is always preferred by sheep, next to the Swedish. This is a remarkable fact to us. We are not, however, much acquainted with the red-top yellow turnip; but the Aberdeenshire yellow bullock, and one or two other yellow kinds, we have repeatedly seen refused by both cattle and sheep, when they had the preference of either the Swedish or the White-globe.

The superiority of Dale's hybrid turnip seems to consist in the fine convex shape of its make, which is an advantage, in some seasons, in preserving the root in the fields from the rotting effects of melted snow and hoar-frost, or frosty rains and sleet.

The White-globe carries the palm from the rest of the white varieties. This is an excellent turnip both for cattle and sheep in the early part of winter, though it is asserted that it does not feed well. This erroneous opinion arises, we conceive, from inattention to a very important fact in the regular progress which live-stock make towards perfection in fattening. When cattle and sheep are transferred from grass, they are fed on turnip; and the turnip which is always given them at first is the white globe. The great change thus made in their food must have a considerable effect on the functions of the gastric region; and particularly if the leaves are given along with the root, which is almost the invariable practice, from a false notion of economy. There is no economy in administering the succulent leaves of turnips, and those of the white globe are particularly so, to engender diarrhœa in cattle and sheep. The blame of the scouring is thus thrown on the turnip. Let the root alone of the white globe be given to stock, and little uneasiness will accrue to them by the sudden change in the nature of the food. There is yet another consideration, arising from the method in which fat is usually deposited in feeding animals. It is matter of observation during the progress to fatness in cattle and sheep, that the fat is deposited in the interior of the trunk before it affects its exterior points. Thus, the kidneys and abdominal

viscera are covered with fat, before the rump, back, or loins, exhibit any symptoms of obesity. The part, then, which the white globe turnip, has to perform, is the filling up of the interior of the trunk with fat; but should this have been already accomplished by the grass, it will, no doubt, afford sufficient nutritive matter to commence a fatty covering of the outside, after the necessary change has been undergone in the system of the animal, by the sudden transition from one kind of food to another.

Clay soils are found to produce roots of more equal shape, and firmer texture, than light soils. Lime applied to turnip land is considered by some, and we believe justly, to have the effect of lessening the proportion of leaves to the root. "The quantity of nutritive matter," observes Mr Sinclair in his Woburn experiments, "contained in different roots of the same variety, varies according to the size and texture of their substance. A root of the White Loaf variety, measuring 7 inches in diameter, afforded only 72½ grains; while the same quantity of a root, which measured only 4 inches, afforded 80 grains."

Carrots requiring a deep soil, and heavy manuring, will not probably extend much in field culture. "We speak from experience," say Messrs Drummond, "when we say that the principal failure of the carrot crop in the field, may be almost entirely removed by attending, in the first place, to bring the seed to the point of vegetating before sowing, by mixing it with sand or earth, kept moist, and turned occasionally for several days; and, secondly, to manage, in the drills, that some nourishing compost, including moss, if possible, be right under the seed, and within reach of the infant plants." In gardening they made an experiment, which tends to show, to those who are not already aware of it, that carrots may be cultivated, to great advantage, in mossy soil; and to indicate, that the carrot may be insured for the table, in old garden soil, by mixing moss and dung together, and inserting the compost in a rut formed with a wedge-shaped dibble, 6 inches wide at top, and at least a foot deep, the seed being sown immediately above the compost.

The following interesting experiments were made, by Messrs Drummond, with the Irish blue potato, on the same lot of ground, and under similar circumstances. The space which

each experiment occupied was 40 square yards, which were drilled and dunged at the rate of 30 tons the imperial acre. They were all planted on 28th May, and raised 12th October 1832.

The first lot was planted on the plan recommended by Mr Knight, Downton. The tubers were whole, weighing half a pound each, and were planted at the distance of 6 inches in the row, and the rows 4 feet apart, and lying north and south; 40 square yards required 90 lb. of seed, and produced 364 pounds, being per acre 136 bushels of seed, and 550 bushels of produce. Net increase, 414 bushels.

The second lot was also planted, with similar tubers to the last, at 9 inches apart. The seed required weighed 60 lb., the produce 326 lb.; being, per acre, 91 bushels of seed, and 493 bushels of crop. Net increase, 402 bushels.

The plants, in both these lots, were highly vigorous, and early in advance of the others. The potatoes were not too large, but the crop contained a great proportion of small.

The third lot was planted the same as the last, but the sets were cut of the common size. The seed required weighed only 6 lb., the produce 276 lb.; being, per acre, 9 bushels of seed, and 417 of produce. Net increase, 408 bushels. The plants in this lot gained fast in autumn, and produced by much the largest potatoes; but they did not ripen well.

The fourth lot was planted with sets cut of the common size, placed 6 inches apart, and only 2 feet between the rows. The seed required weighed 12 lb. and the produce 376 lb., being per acre 18 bushels of seed and 568 of produce. Net increase 550 bushels. The potatoes in the produce of this last lot were the most equal sized.

These experiments entirely run counter to Mr Knight's theory and consequent practice. They were conducted with great care, and the results were not what the experimenters themselves anticipated. We cannot see *a priori* what peculiar advantage large tubers can confer, though it certainly accords with the operations of Nature to plant whole potatoes in preference to mutilated ones; but, in this matter, experience alone should regulate practice. We may mention a compulsory experiment with potatoes which we made in 1830. The seed that was allotted to

the planting of a certain number of acres in a field well adapted to the growth of the potato having been exhausted, and three dunged drills being about to be lost for want of seed, we caused them to be planted with the small whole potatoes which had been picked out from among the rest when they were cut for seed. The largest of them did not exceed the size of a walnut, and the least might have been about that of a filbert. There were 36 bushels of them, and they were intended partly for the pigs and partly to be boiled for the poultry. They were planted in the three drills, at about 3 inches asunder. They were of the Small American kind. Much jesting passed among the work-people at the expense of these minikins; and we confess we put no great faith in them. But their produce admonished us to "despise not the day of small beginnings." These, minims as they were, brairded the first, displayed the most vigorous stems, and produced the greatest and most equal crop of potatoes of the whole field. Much has yet to be learned of the various ways in which various circumstances affect the growth of plants.

A comparative trial of the weights of the produce of 4 yards along a drill of each kind of potato, which were planted on a light loam on the 30th April, and raised on the 3d October 1832, gave the following results:

LATE SORTS.

Buff, flavour superior, mealy,	41 lb.
Irish Blue, do. do.	36
Red French Kidney, good, waxy,	35½
Pink-eyed Kidney, superior, mealy,	29
Perthshire Red, flavour fine, waxy, but firm,	27
Guernsey Kidney, superior, mealy,	21
Red and White Kidney, good, mealy,	21
Black, waxy,	18½
Yam, for cattle,	18½

EARLY SORTS.

Taylor's Forty-fold, superior, very white and mealy,	40½ lb.
Miller's Early, flavour good,	30½
American, good, mealy,	25½
Ross' Improved, superior, white, mealy,	24
Round Ash-leaved, very early, waxy,	12
Ash-leaved Kidney, good, mealy,	10½
Calico, failed from curl.	

Taylor's forty-fold potato was found, upon repeated and careful trials, to exceed in produce every other early variety in a considerable degree, and it is also superior to most of the late sorts. It is particularly fine in flavour, is not suited for use in winter, but would be a very profitable variety for cultivation in the field to produce an early supply for the market in towns.

The cultivation of Mangel Wurzel seems not to extend in Scotland. It requires here a deep soil. The heavy crops of it which can be raised in the west of England, in Somersetshire, on poor thin blue clay, indicates that the Scottish climate is not suited to the nature of the plant. Its rough and unmanageable seed, and the necessity which exists of taking up and preserving the crop from frost, impose a labour which is always reluctantly betowed on the food of animals, and which, no doubt, constitute in themselves obstacles to its extended cultivation. Milch cows are exceedingly fond of this root, and prefer it to all others, which we have had repeated opportunities of witnessing. It imparts a fine flavour and peculiarly rich colour to butter in winter. In garden culture, it may be raised to upwards of 8 lb. in weight, with the application of a little moss. It affords 390 grains of nutritive matter out of 7000.

Kohl Rabi is a root, whose solidity is much above the turnip medium standard. One which should have only weighed 2 lb. 2 oz., actually weighed 3lb. It contains 420 grains of nutritive matter out of 7000, and stands in this respect next to the Drumhead cabbage. Kohl rabi, or turnip-cabbage, is much esteemed at table in Germany, where, when cut small as dice, and well stewed, it is considered equal to cauliflower.

The Drumhead cabbage grows best on a clayey loam. It should be planted out in May, at the rate of 8000 plants per acre. A plant will acquire a weight of from 20 to 24 lb. Its nutritive properties are high, being 430 grains out of 7000, standing next to the Swedish turnip. Some consider one acre of it worth two of turnip for the purpose of the dairy. It will yield a supply till spring, by taking off only the outer leaves when used. It may be stored up. Dr Howison mentions that cabbages are stored in Russia by being set together to save room, and a roof formed over them of old boards, which are covered with old dung; and perhaps any other rubbish, such as

potato stems, would answer the same purpose in this country, and then some earth is shovelled over the covering. Chimneys are left to let out the confined air when it thaws, or towards spring; and they are stuffed up when it freezes.

In regard to grasses for permanent pasture, we are persuaded more of them are brought into notice than their good properties will warrant. Independently of perennial rye-grass and white clover, which must always occupy a large share of every permanent pasture, perhaps five or six of the others are all that are worth cultivation. It is true many worthless grasses will grow up among our most carefully laid down pastures, and they no doubt assist in thickening the sward. But this is surely no adequate reason to sow them; and if it be necessary to sow a certain quantity of seed to cover the ground, that quantity should be composed of the best kinds. One reason for sowing a great number of kinds is, that more plants will thrive closely together of different sorts than of the same sort. Allowing this to be the fact, there is still no necessity for incurring the trouble and expense of sowing worthless kinds, when a variety of them will grow naturally out of the soil to form a thick sward. Should the different kinds arrive successively at their greatest vigour, the sown ones of the best can be selected on account of their coming to maturity at the different seasons when pasturage is required. It seems that 4½ bushels will just furnish as many fertile seeds, that is seven, to the square inch, as there are plants in that space in a natural pasture; but if even more are required to render the pasture better, more of the best kinds only should be sown to insure the requisite thickness of sward.

Among the curious things which were exhibited, we may mention a plant of the annual rye-grass, of spontaneous growth, measuring from 2½ to 3 feet high, and having 320 stalks which contained 46,000 seeds. Potato-flour was presented by Miss Colquhoun, Melville Place, Stirling, which was 38 years old, and in fine condition. It was made at Camstradden in 1794, from potatoes, which had been damaged by a sudden rise of the water in Lochlomond. Frosted potatoes, it seems, answers as well as sound ones for making potato-flour. Biscuits, in good preservation, baked in 1800, from wheat-flour, were presented by Mrs Gray, Bearside. Messrs Drummond had a specimen of beech

hedge, which was reared simply by annually cutting the sides close in and nearly perpendicular, and never the tops till they had arrived at their desired height. 900 yards of these have been kept 7 or 8 feet in height more than 20 years, increasing only 2 or 3 inches in width. They are 15 inches wide at bottom, and 12 inches wide within 6 inches of the top. In 1821 we made a very successful transplantation of a beech hedge of rather more than 6 feet in height, around a piece of ground for forcing melons, and cucumbers, and a few very early culinary plants. It was kept switched up with a hedge-bill in the shape of a hog mane, and so closely did the leaves interlace, that they completely intercepted the view. The hedge remains in full vigour to this day.

In regard to the making of straw ropes for thatching stacks, Messrs Drummond were pleased "to witness the emulation existing among this class of contributors, chiefly farm servants. The advantage of expertness, and of a well made article, must be obvious, both in respect to facility and efficacy in harvest work, and no master should undervalue this effort of his servants. True, harvest is not a season for mere niceties; but, in the best regulated farms, these ropes are made at a slacker season, and the servants will do their work much quicker by first learning to do it well." Trifling as the making of straw-ropes for stacks appears to some people, who thatch their stacks with the greatest carelessness, and thereby suffer loss in corn by the depredations of crows, and the effects of rain, we consider an opposite error would be committed by too great a desire to make fine ropes, such as those would be made from drawn straw firmly twisted. These too firmly twisted ropes are a great nuisance for a long time in the dunghil, as they cannot be rotted down along with the rest of the dung; and to chop them small, or untwist them, would almost occupy the time of a man on a large farm. Neat, small, smooth straw ropes can be made without drawing the straw, with either the new straw or the old straw damped of the common oat. We have seen good ropes made very expeditiously with a small wheel, such as rope-spinners use for spinning hemp into yarn. Five or six ropes can be made at a time, by the men moving backwards and letting out the straw from under the left arm, through the right hand, which is pro-

tected by a piece of sacking. The best makers of straw ropes, and the neatest thatchers of stacks, are to be found in Forfarshire. There a large stack of 18 feet diameter at the easing only requires twenty-four ropes, which are small, smooth, and not too hard twisted. They are placed lozenge-shaped, and fastened neatly at the easing of the stack.

Among the communications which appear in the end of Messrs Drummond's small publication, that by Mr Smith of Deanston Works is the most important. It treats of thorough drainage of land, and of deep ploughing.

Since the advantages of wedge-draining strong clay soils became so apparent, the same plan has been introduced into the thinner soils, which rest on a subsoil of different materials. Of the latter class, the greatest proportion of the soil of Great Britain and Ireland consists. This subsoil is either pervious or impervious to water. On the former, the soil requires no draining; if on the latter, it is the most difficult of all kinds of soil to drain. Most of our soils rest on the latter. Hence we may safely say, that by far the greatest proportion of the soil of the kingdom requires draining. Much has been already accomplished by draining, and indeed it is the basis of all the improvement which has been effected on the face of the country. But hitherto the principle which has guided the art of draining, has chiefly consisted in the detection of isolated springs, by cutting deep drains across the face of sloping ground, which, at the same time, catch the surface water as it runs down the steeps. Now the fact is, as Mr Smith truly says, that "the portion of land wetted by water springing from below, bears but a very small proportion to that which is in a wet state, from the *retention* of the water which falls upon the surface in the state of rain; and a vast extent of the arable land in Scotland and England, generally esteemed dry, is yet so far injured by the tardy and imperfect escape of the water, especially in winter, and during long periods of wet weather in summer, that the working of it is often difficult and precarious, and its fertility much below what would uniformly exist under a state of thorough dryness. A system of drainage, therefore, generally applicable, and effecting complete and uniform dryness, is of the utmost importance to the agricultural interests, and, through

them, to all the interests of the country. By the system here recommended this is attained, whilst the expense is moderate, and the permanency greater than on any other system yet known. This system is the application of wedge-draining, which has been practised with so much success on carse clay lands, to lands which are kept wet by a retentive subsoil. The principle of the system is *the providing of frequent opportunities for the water rising from below, or falling on the surface, to pass freely and completely off;* and hence it is proposed to call it the '*frequent drain system;*'"—a term which does not sound euphonically to our ears, but as the system is agreeable to good husbandry, we shall not quarrel with its name.

This subject is too important to be discussed or illustrated in so casual a manner as must be done in a paper of this sort. We may remark, in concluding, that we have tried the effects of the "frequent drain system," on retentive-bottomed land so long ago as 1823, and we were sure we were repaid by the subsequent crops of turnip and barley alone; and witnessing its good effects, we continued to practise it, not in so perfect a manner as that described by Mr Smith, but upon the same principle of "providing frequent opportunities" to allow the water to pass away; and certainly in ignorance that it had ever occurred to any one else to apply the wedge-draining system of the carse clays to thinner and lighter soils. Not long ago we threw together some "Thoughts on Draining" connected with this subject, which appeared in this Journal; but the sentiments are rather too much subdued in that paper.

As iron ploughs are apparently superseding the wooden, we give the results of a number of trials made by the Gargunnock Farmers' Club, with the dynamometer, to ascertain the comparative resistance made by the two kinds of ploughs in furrows of the same depth. Four trials of wooden ploughs gave an average weight to the plough of 11 stones 9 lb., 16 lb. to the stone; and the resistance which they offered under a furrow of 9 inches by 5, was 25 stones, and one of 11 inches by 7, 32 stones 12 lb. Seven trials of iron ploughs gave an average weight of 14 stones 4 lb., and the resistance under a furrow of 9 inches by 5, was 27 stones 9 lb., and of 11 inches by 7, 36 stones 9 lb. These trials were made on a field of strong carse

clay, furrowed-drained some years ago, under a three years' lea. The greater resistance of the iron ploughs may be accounted for in some degree by their being set for lighter land, and of course they would cut a sharp-edged furrow, thereby causing an extra strain. Upon the whole, they are as easily drawn as the wooden, and ploughmen assert that they are as easily held. The firmness and durability of the iron are much superior to the wooden, and which of course render them more economical.

MISCELLANEOUS NOTICES.

I. *West Indies.*—It appears by the Report from the Select Committee of the House of Lords, that the productions of our West India Colonies amount yearly to the sum of L22,496,672.

BIRTISH COLONIES.	
Jamaica,	£11,169,661
Barbadoes,	1,270,063
Antigua,	898,220
St Christopher's,	753,528
Nevis,	375,182
Montserrat,	211,160
Virginia Islands,	201,122
Grenada,	935,782
St Vincent,	812,081
Dominica,	561,858
Trinidad,	737,017
Bahamas,	269,806
Bermudas,	175,560
Honduras,	146,700
	£18,516,540

CEDED COLONIES.	
Demerara and Essequibo,	£2,238,529
Berbice,	629,461
St. Lucia,	595,610
Tobago,	516,532
	£3,980,132
British Colonies,	18,516,540
Total,	£22,496,672

The following Estimates of the Value of our West India Colonies is taked from the above Report:—

BRITISH COLONIES.	
Jamaica,	£58,125,298
Barbadoes,	2,089,630
Antigua,	4,364,000
St Christopher's,	3,783,800
Montserrat,	1,087,440
Nevis,	1,750,100
Virginia Islands,	1,093,400
Grenada,	4,994,365
St Vincent,	4,006,866
Dominica,	3,056,000
Trinidad,	4,932,705
Bahamas,	2,041,500
Bermudas,	1,111,000
Honduras,	578,760
	£100,014,864

CEDED COLONIES.	
Demerara and Essequibo,	£18,410,480
Berbice,	7,415,160
Tobago,	2,682,920
St Lucia,	2,529,000
	£31,037,565
British Colonies,	100,014,864
Total,	£131,052,429

And the Report contains an estimate of the value of the Exports and Imports; also the Number of Ships, the Tonnage, and Number of Men employed by the said Colonies, as under:—

EXPORTS.		IMPORTS.	
Value,	£ 8,394,484	Value,	£ 4,530,008
Ships,	5,448	Ships,	4,458
Tons,	562,751	Tons,	531,758
Men,	39,879	Men,	39,304

II. *Imports and Exports of Ireland in* 1801 *and* 1825.—In addition to the agricultural articles of import from Ireland for one year, which we gave in our last Number, we insert a tabular view of the whole imports and exports from that important portion of the United Kingdom in 1801 and 1825, in order to shew the rapid and great increase of the trade of that country since the Union. These statements are taken from official documents.

1st, Imports into Ireland from all parts.

	In 1801.	In 1825.
Cotton manufactures, entered by the yard,	44,314 yds.	4,996,885 yds.
Cotton yarn,	375,000 lb.	2,702,000 lb.
Cotton wool,	1,200,000 „	4,065,000 „
Flax seed,	376,000 bush.	535,000 bush.
Tallow,	16,000 cwt.	131,000 cwt.
Iron, unwrought,	7,454 tons.	17,902 tons.
Coals,	315,000 „	738,000 „

2d, Exports from Ireland to all parts.

	In 1801.	In 1825.
Cotton manufactures, entered by the yard,	1,256 yds.	10,567,000 yds.
Linen manufactures,	37,911,000 „	55,114,000 „
Flax, undressed,	1,639 cwt.	54,898 cwt.
Irish spirits,	178,000 galls.	629,000 galls.

3d, Aggregate Official Value of Imports from, and Exports to, all parts.

	Imports.		Exports.
In 1801,	£4,621,000	In 1801,	£4,064,000
1825,	8,596,000	1825,	9,243,000

4th, Aggregate Value of Produce or Manufactures of the United Kingdom, as distinguished from Foreign or Colonial Merchandise, exported from Ireland.

In 1801,	L. 3,778,000	In 1825,	L. 9,102,000

5th, Tea entered for Home Consumption in Ireland.

In 1792,	1,844,000 lb.	In 1822,	3,816,000 lb.
1793,	2,148,000 „	1823,	3,367,000 „
1794,	2,041,000 „	1824,	3,387,000 „
1795,	2,970,000 „	1825,	3,889,000 „
1796,	2,326,000 „	1826,	3,807,000 „
1797,	2,492,000 „	1827,	3,888,000 „

It is important to keep in mind, that during the first of these two periods, the duty on black tea was only 4½d., and on green 6½d., while in the second it was cent. per cent. Hence the increased consumption is indicative of much more than a *proportionate* increase of wealth.

6th, Coffee entered for Home Consumption in Ireland.

In 1792,	.	40,000 lb.	In 1822,	.	265,000 lb.
1793,	.	52,000 "	1823,	.	245,000 "
1794,	.	100,000 "	1824,	.	269,000 "
1795,	.	91,000 "	1825,	.	316,000 "
1796,	.	61,000 "	1826,	.	475,000 "
1797,	.	132,000 "	1827,	.	585,000 "

7th, Sugar entered for Home Consumption in Ireland.

In 1792,	.	161,000 cwt.	In 1822,	.	370,000 cwt.
1793,	.	196,000 "	1823,	.	386,000 "
1794,	.	209,000 "	1824,	.	410,000 "
1795,	.	227,000 "	1825,	.	423,000 "
1796,	.	182,000 "	1826,	.	318,000 "
1797,	.	231,000 "	1827,	.	319,000 "

III. *Grants to the Charities in Dublin.*—The following is a statement of the principal sums annually paid by Government to the charities in Dublin.

Protestant Schools,	L. 38,300	Brought forward,	L. 126,524
Foundling Hospital,	. 32,500	Dublin Police, .	. 26,600
House of Industry,	. 36,640	Lock Hospital, .	. 8,000
Lunatic Asylum, .	. 7,084	Dublin Society, .	. 9,230
Fever Board, .	. 12,000	Education Society,	. 5,538
Carry forward,	L. 126,524	Total,	L. 175,892

IV. *On the Infertility of Granite Soil. By John Prideaux, Esq. From the Transactions of the Plymouth Institution, with Remarks on paring and burning granite soil, and others where carbon is deficient. By Professor Rennie, King's College, London.*—" The granite near Plymouth is rich in schorl, and poor in mica; consequently less impregnated with magnesia, and perhaps more subject to the operation of weather, than is common to that rock: circumstances which may help to explain its comparative fertility in grass. In summer it feeds great numbers of cattle; and in extremely hot and dry weather, when herbage is elsewhere burnt up, assumes the appearance of great verdure; its humid soil and cold atmosphere, which at other times give a pale and hungry aspect, contributing then to its fertility. The close crystalline texture of the rock, obliging the condensed rains and fogs to run over its surface, is probably the cause that the valleys are boggy, extending in numerous cases up the hill sides, and across the summit. These bogs, dangerous to cattle, are not without their value, being the great depositaries of fuel, an important article in those bleak regions, where a fireside is often agreeable in an evening in July. The peat gradually accumulating there, has attained a depth, in many places, exceeding twenty feet. The deeper the more it is prized; the lower portions, condensed by the superincumbent weight, becoming a much more effective fuel. Springs commonly break out from these bogs, as though superficial to the stone; but there are instances of a different kind: on the eastern foot of Ugborough beacon, is a fine spring pouring out of the rock probably two hogsheads in a minute. Such as these may perhaps owe their origin to another condition of the granite, where the crystals of quartz and felspar are incoherent, and the schorl has very much disappeared, forming a sort of gravel many yards in depth. Such a bed of great extent lies on one side of Hessy-tor, near the prison. In wood this rock appears to be unproductive. A few young plantations of fir do not yet appear to suffer more than might be expected from the climate; some fine trees are found

about the borders of the streams, and trunks of considerable dimensions have been dug up from the bogs; but it is said by gentlemen possessing estates on the granite, and my observation agrees with it, that trees after reaching a certain height rise no farther, spreading and twisting their branches without proportionate increase of trunk. Wistman's Wood, a plot of oaks, supposed to be a thousand years standing, the largest less than a man's waist, and within twenty feet high, is an extreme instance. The outline of the granite from Tavistock to Hessy-tor southward, may indeed be almost traced by the coppice, which clothing the declivities of the slates and other rocks that abut against it, disappears suddenly on its gritty soil."

The remarks on the foregoing paper on the infertility of the soil in granite districts, has suggested to me a probable remedy for this. It is now generally agreed upon, I believe, that carbonic acid gas, diffused through water, is the principal, though not the only, food of plants; and, consequently, where this is deficient, any soil will be barren, such as that where the base is the debris of growth, or other rocks containing little or no carbon. This view is strongly corroborated by what Mr Prideaux elsewhere states, when he says, "Greenstone appears to form the fertile hill of Rock and Estover estates, well wooded." Again, "the killas is highly fertile, differing singularly from the adjoining granite. In no place is this more remarkable than at Buckland on the Dart, where the killas run in a trough, between two granite mountains. The vivid green of the turf, and the rich wood running up the acclivities, contrast strikingly with the pale herbage and bald crowns of its overtopping neighbours. It appears amidst the slate in Holm parish, and the different value of the land marks its superior fertility. At Yalland estate, at the foot of Skipley-bar, some fine trees appeared in the midst of the granite. On approaching them, they were found to be growing on a patch of the killas, not a tree spreading out to either side." On passing through the Black Forest, in Germany, last autumn, I was particularly struck with the effect of paring and burning the soil in somewhat similar circumstances of barrenness; for, though the soil was not granitic in any of the spots which I examined, it was equally deficient in carbonic matter, the underlying rock being a siliceous or argil slate. The steep and almost perpendicular declivities were, in their apparently natural state, covered with stunted brushwood, chiefly birch and hazel, starved Scotch firs, and tufts of the coarser grasses; and no English farmer, I think, would have dreamed of trying to rear a crop of corn in such a place. The industrious foresters, however, undeterred by what might appear, under the most favourable circumstances, an indifferent prospect, carefully grub up the brushwood, pare off the scanty sward of grass, and, piling them up in small heaps, burn the whole to ashes. These are scattered over the pared surface, and dug, or rather scratched in, with a sort of pronged hoe or narrow spade. In some instances, a slight dressing of dung is added, though this is not universal; but, after all these operations, the soil seems to be little more than a mass of half broken and half powdered slates. I was, therefore, not a little surprised to observe crops of oats growing there,—not very good certainly, but tolerable enough to repay the farmer's trouble. I am, therefore, I think, fairly entitled to infer, that if our granitic and other soils, deficient in carbon, were thus treated, their fertility would thereby be improved.

V. *Experiments on Buck-Wheat.*—On the 2d of April, M. Lassaigne placed 15 grains of buck-wheat (*Polygonum Fagopyrum*) in a platinum capsule containing some washed flour of sulphur, which he had moistened with distilled water, recently prepared, and he then covered the whole with a glass-bell, to the upper part of which was adapted a stop-cock, when, by means of a glass tube curved like a syphon and terminating in a funnel, enabled him to pour water from time to time on the sulphur. At the end of two or three days, the greater part of the seeds had germinated. They continued to be watered daily, and in the space of fifteen days they produced stems about two inches long, which were covered with a great many leaves. These, together with the seeds which had not germinated, were carefully collected, and reduced to ashes in a platinum crucible. The ashes obtained from them weighed about 8½ grains. These, in 220 parts, contained 190 of the phosphate of lime and 5 of silica; 15 grains of the same seeds being incinerated, yielded the same quantity of ashes, which were composed precisely of the same ingredients. It clearly follows from this experiment, which was repeated a second time with the same result, that after their development in distilled water, the young plants of buck-wheat did not contain a greater quantity of alkaline salts than the seeds from which they were raised. Whence we may conclude with Theordore de Saussure, that the alkalies and earths contained in vegetables have been absorbed and taken in from the soil.—*Rennie's Field Naturalist's Magazine for May* 1833.

VI. *Method of obtaining Cream from Milk.*—A peculiar process of extracting cream from milk, by which a superior richness is produced in the cream, has long been known and practised in Devonshire; this produce of the dairies of that country being well known to every one by the name of "clotted cream." As there is no peculiarity in the milk from which this fluid is extracted, it has been frequently a matter of surprise that the process has not been adopted in other parts of the kingdom.

The opportunities which I possess of making experiments connected with farming, induced me to direct my attention to the produce of the dairy with a view to increasing the quantity and quality of cream and butter. Having, therefore, made some inquiry into the practice of the Devonshire dairymen, I found, that, besides the improved quality of the cream, a larger quantity of butter was produced by this mode. I therefore adopted their system as the groundwork of my experiments. I found, however, that their process is attended with several disadvantages. The mode of applying artificial heat is rude, and the effect uncertain, being entirely dependent on the skill of the dairyman: the result is also perpetually varied by even the weather, and other accidental circumstances, over which he has no control.

My first object, therefore, was to construct my apparatus so that its operation should be (as nearly as possible) invariable, confining myself only to that part of the Devonshire process in which heat is applied to aid the separation of the cream from the milk. After a variety of experiments on the temperature applied, the period of its application, and the form and material for the vessels, I obtained the greatest results by adopting the following process:—A four-sided vessel is formed of zinc plates, with a false bottom. The only communication with the lower compartment is by a hole in the side with a lip, through which it may be filled or emptied.

Having first placed at the bottom of the upper compartment a plate of perforated zinc, with two ringed handles, forming an instrument like the drainer of a fish-kettle, the area of which is equal to that of the false bottom, a gallon (or any given quantity) of milk is poured (immediately when drawn from the cow) into it, and must remain there at rest for twelve hours; an equal quantity of boiling water must then be poured into the lower compartment through the lip: it is then permitted to stand twelve hours more (*i. e.* twenty-four hours altogether), when the cream will be found perfect, and of such consistence that the whole may be lifted off by the finger and thumb. It is, however, more effectually removed by gently raising the plate of perforated zinc from the bottom by the ringed handles, by which means the whole of the cream is lifted off in a sheet, without remixing any part of it with the milk below.

As I obtain the best results when the upper part of the vessels are quite full of milk, and the lower part with boiling water, to suit the variation in the quantity of milk at each meal, I find it convenient to have milk vessels of two sizes, half-a-dozen of each, the largest size 18 inches long, 12 inches wide, and 9 inches high, or 4½ inches for milk, and 4½ inches for water. The small size 12 inches long, 8 inches wide, and 6 inches high. With this apparatus I have instituted a series of experiments, and, as a mean of twelve successive ones, I obtained the following results:

4 gallons of milk, treated as above, produced, in 24 hours, 4¾ pints of pure clotted cream, which, after churning from 12 to 15 minutes, gave 40 ounces of butter.

4 gallons of milk, treated in the common mode in earthenware pans, and standing 48 hours, produced 4 pints of thin cream, which, after churning from 60 to 90 minutes, gave 32½ ounces of butter.

The increase in quantity of cream, therefore, is rather more than ⅛th, and of butter ¼th, or 20 and 25 per cent.

It is fair to state, that these experiments were made in the winter of 1828, when a longer time is required to separate the whole of the cream from the milk than in warm weather, and the cream rises generally of a thinner quality, and in consequence, I invariably obtain a much larger product of butter in proportion to the quantity of cream, during the winter months. The advantages, however, are not limited to this increase in quantity, since it appears in my process that the whole of the cream ascends to the surface of the milk in one-half the usual time, and that ten or fifteen minutes' churning is sufficient to produce butter from such cream, while it often requires ninety minutes (or more) to decompose cream obtained by the common method. The results are also constant; no variety in flavour, colour, or consistency, is observable, although my experiments have been made under circumstances which would have affected all these qualities in the common process.

I am not prepared to declare how much of the advantage of this operation depends on mechanical, and how much on chemical action. It has been long known that the application of artificial heat has facilitated the separation of cream from milk, probably by forming an ascending current in the fluid, as well as disengaging the suspended particles of cream, by rendering the whole more liquid. But I have found that the material of which I make my ves-

sels is a very important feature in the process; for the cream is formed in zinc vessels many hours earlier than in earthen ones. I hazard a conjecture, that this is owing to a galvanic effect, which is produced by the lactic and acetic acids (developed in the milk by heat and rest) acting slightly on the zinc plates of the vessel. We have, therefore, two fluids acting on one metal, which is well known to be a galvanic arrangement of the second order. The acids, which would otherwise cause the coagulation of the milk, are thus taken up by the zinc, and the milk, by remaining more perfectly fluid, admits the easy ascent of the suspended cream. I have ascertained, on analysis, the presence of acetate and lactate of zinc in the skim milk, which would, therefore, seem to favour this hypothesis.

I ought to state, that my experiments have been made on land which is not most favourable for the production of butter, it being cold or gravelly; indeed, the whole of the Kentish land is unfit for producing cheese, a certain proof of its inferiority. As, however, my experiments have been comparative, and made with the produce of the same land, so it is reasonable to expect that proportionate advantages will be obtained in all cases, be the land richer or poorer. I do not claim the merit of originality in this process, further than in the use of the zinc vessel, and the mode in which the heat is applied, by which the results are rendered certain and invariable; neither do I profess to have obtained the maximum of quantity which can be produced by this process. The operation, however, is so simple, and its efficiency so apparent, that it cannot be too generally known. The experimental farmer will instantly perceive the advantages accruing from its adoption, and probably his attention to the subject may produce greater results. I shall feel richly rewarded if, by exciting an interest in the subject, I can produce the slightest improvement in the quality or mode of producing an article, which may properly be deemed one of the necessaries of life *.—*Mr George Carter, Mottingham Lodge, near Eltham, Kent.*

VII. *Swing Frame for Cheeses.*—New cheese requires to be hardened considerably by gradually drying before it becomes fit for market. For this purpose the cheeses are spread in a single layer on the floor of the cheese-room, and are turned by hand every day, in order to expose each surface alternately to the air. This, on a large dairy farm, is a slow and laborious operation, which, as it devolves on the female servants, sometimes prevents them, in the hurry of business, from paying proper attention to keeping every implement used on the dairy in that degree of order and absolute cleanliness so essential to the good quality of the produce. Another objection to the common method is, that the floor on which the new cheeses are laid soon becomes penetrated with moisture, so that the benefit which each surface of a cheese in succession gains by exposure to air, is in part lost by being placed the next day in contact with the damp floor.

* It appears from Mr Carter's statement that milk which has been subjected to his process is more or less impregnated with soluble salts of zinc. The well-known astringency of these salts, and their emetic quality when in a state of moderate concentration, induced the Committee to inquire what use is made of the milk after separation of the cream. Mr Carter replied, that it is employed wholly in feeding pigs, and that the health and growth of these animals do not appear to be at all affected thereby.—*From the Transactions of the Society of Arts*, 1832.

A machine of very simple construction, has been recently contrived by Mr Blurton, of Field Hall, near Uttoxeter, by which these objections are not only completely removed, but the process of drying amazingly accelerated. We extract our present account of it from the last part of the *Transactions of the Society of Arts*, who have conferred their large silver medal on Mr Blurton for the invention. The machine consists of a dozen strong shelves framed together, and having bars nailed from top to bottom of one side to prevent the cheeses from falling out while in the act of turning. The frame is suspended on two strong pivots, one of which is set into the wall of the room, and the other is supported by a strong post. Two catches keep the frame upright, and prevent it from being turned more than half round. By first filling the shelf immediately below the axis of the frame, and then placing the cheeses alternately on the two nearest shelves above that which has been already filled, the preponderance of one side over the other can never be more than the weight of one cheese; the whole power, therefore, required to turn the machine cannot, in any circumstances, be greater than this and the friction of the pivots. The cheeses, in the act of turning, drop on the shelves which, in the former position of the frame, were above them, and having been exposed to a current of air for twenty-four hours previous, have become perfectly dry.

Mr Blurton has had the machine in use for five or six years, and finds that by means of it fifty-five cheeses are turned in the same time which is required for turning two by hand. Three other advantages attend its use; first, that a room thus furnished will hold thrice as many cheeses as when they are laid on the floor; secondly, that the shade afforded by the shelves, together with the current of air which passes between them, has the effect, in hot weather, of preventing excessive sweating, and consequently loss both in weight and quality, as well as diminishing the necessity of rubbing the cheeses; thirdly, the ripening of the cheeses is hastened, so that on an average they are ready for market five weeks earlier than usual.—*Repertory of Patent Inventions, No.* 100.

QUARTERLY AGRICULTURAL REPORT.

May 1833.

It has been frequently observed, that the quality of the seasons in this country has changed very perceptibly within these few years, and one of the reasons for the change has been ascribed to the shifting of the position of the ice in the arctic regions. Whether this fact, if it be a fact, would be sufficient to account for a great change of climate in a distant latitude, we know not; but there is no doubt that both winter and summer, and particularly the former, have presented a more benign aspect for some years past, than they were wont. Our wish is, that this benignity of the seasons may cause our "valleys to stand so thick with corn, that they may shout for joy, and sing."

The peculiarity of the weather in the last half-year (which period this report embraces), has consisted in the winter being mild and dry, and the spring cold and wet. There never was perhaps a drier January than the last, not a shower of rain or snow having fallen in it, and, in consequence, the mills obtained but a short supply of water,—a remarkable circumstance for that period of the year. Vegetation has been much retarded by the cold spring, which retardation, however, will yet be beneficial to the wheat plant and fruit trees. But rain having fallen at the same time, a raw and cold bed was prepared for the seed, especially in thin clay soils in upland districts. Young wheat, on *dry* soils, is very luxuriant; on poor thin soils, it has still a sickly appearance, and on this class of soils it is somewhat thin. Oats exhibit a remarkably healthy and strong braird. The barley is beautiful. Early sown beans and peas, on dry soils, look well; but those on wet soils are late and sickly. The extent of land sown with them is limited, owing to the wet weather. The young grass looks extremely well, and promises a heavy crop of hay, the clover not having been thrown out this winter. Pasture-grass is from a fortnight to three weeks later than usual. Since the very mild weather in May, it has become luxuriant. Fine grass for feeding lets higher than last year, but the coarser kinds for rearing stock have fallen considerably in price.

Turnips proved much superior to anticipation, both in England and Scotland. They were not large in bulb, but it has been universally remarked, that they have withstood consumption in an uncommon degree. The three weeks of black and of heavy hoar-frost at the end of the year, had no bad effect upon them. A more striking illustration could not have occurred to show not only the superior feeding powers of comparatively small but firm roots of turnip to very large and probably spongy ones, than the power to resist successfully the effects of frost. They have consequently let at very moderate prices, as low as three-halfpence per head per week for sheep, and in some instances, a supply of sheep could not be obtained to eat them off.

The greater part of the winter having been dry, sheep have passed a favourable season on turnips, and are now in fair condition. The lambing season was very cold and wet, but the loss of lambs was not so great as might have been expected. Twins prevail to a remarkable degree this season in Leicester flocks. Wool has of late been in demand, and realized an increase of price. There is at present every prospect of a rise of price in the new clip, though we cannot anticipate that to be considerable.

Grazing cattle are generally in fair condition. Live-stock of every description have been in demand, and very high prices have been ob-

tained; and strong anticipations still exist of the prices continuing favourable to pay for grazing. Notwithstanding the promising appearance of grass, the demand for stock has decreased a little, and particularly for lean cattle. Indeed the markets for live-stock have been in an anomalous state for the last half-year. It is not easy to account for the high price of every species of stock. The fatal disease of rot having carried off vast numbers of sheep in England three years ago, may account for the scarcity of that kind of stock now, when the drafts of that period should come into market; but the same reason will not apply to cattle. Can the short supply of mutton have directed the demand upon beef? And yet beef is not sold above sixpence a-pound, even in large cities. Were fewer cattle bred three years ago? The importation of cattle from Ireland has been less this last year than the preceding one, owing to the disturbed state of that country in 1832; but that deficiency of itself is not sufficient to account for the great rise of price in the British markets. Fat cattle are at least from L.4 to L.5 a-head above last year's prices, and breeding stock are fully above these prices.

The prices of all kinds of grain have been unusually low for the last six months, much too low to remunerate the farmer. The best wheat in the Edinburgh market has been as low as 51s.; and the aggregate average for the kingdom, at the beginning of May, amounts only to 53s. 4d. the quarter. Had good prices not been obtained for cattle and sheep, the situation of the farmer at this moment would have been most deplorable. This circumstance alone shows the advantage of a mixed system of crop and stock to one purely of corn. The relative state of prices this season contradicts most flatly the old, but usually true, maxim of "down corn, down horn." Prices of grain have advanced a little since March, probably owing to the unfavourable aspect of the weather at seed-time; but since the appearance of the fine weather which we are at present enjoying, they have reverted to their dull state. We have seldom seen so much bulk in the barn-yard at this season, those who are at all able retaining their wheat for better prices; the bulk of straw enabling them to do so without incurring the expense of thrashing and storing up in granary. There never was a May, perhaps, in which so much grain remained in the hands of the farmer, and so little, of course, has passed into those of corn-dealers.

Upon the whole, the farmer must not despond. A fine season and another fine crop appear advancing to encourage him. Apprehension may, no doubt, arise on the unfavourable effects of an unpleasant seed-time. But a late spring is always beneficial to this country. A fine

summer would more than compensate for the disadvantages of a harsh spring. The year 1815 produced a crop of every kind of produce after a cold and wet spring, superior to any we have since seen.

The very low price of grain has been unable to tempt corn-dealers to speculate. Indeed, such is the present depression in every department of commercial enterprise, so distracted are men's minds with uncertain prospects, and so complete a dissolution seems to await every interest in the country, that capitalists, in trade and out of it, lock up their surplus cash, and watch the issue of events. Hence the present universal stagnation in every kind of business.

In the midst of this "confusion worse confounded," as though there is not already sufficient business chalked out to occupy the deliberate attention of three sessions of Parliament instead of one; and when the price of grain is destructively low to the farming interest, Earl Fitzwilliam produces his uncalled for anti-agricultural resolutions, which he has hawked about for years in speeches and pamphlets through all parts of the country. We confess we cannot appreciate his lordship's motive in thus obtruding the question of the Corn Laws upon the attention of the Legislature at this particular moment. A more unsuitable time for the exhibition could not have been chosen.

We do not at present purpose to enter into a full discussion on the comparative advantages of a fixed and a graduated scale of duty on the importation of foreign corn, though his Lordship has provoked it; but we must record his Lordship's resolutions, in order that those who succeed this our generation, may see with what logical acumen the economists of the present day support their dogmas.

"1. Resolved, That it appears to this House that the weekly average price of wheat, as fixed subsequently to the passing of the 9th Geo. IV. c. 60, was, on the following days, viz.—

	Per quarter.		Per quarter.
1828—July 11.	55s. 7d.	1831—Jan. 7.	68s. 3d.
Oct. 3.	65 0	April 1.	72 4
1829—Jan. 2.	75 11	July 1.	66 7
April 3.	70 3	Oct. 7.	61 0
July 3.	68 2	1832—Jan. 6.	59 1
Oct. 2.	60 0	April 6.	59 6
1830—Jan. 1.	55 5	July 6.	63 2
April 2.	65 1	Oct. 5.	54 7
July 2.	68 6	1833—Jan. 4.	52 6
Oct. 1.	62 0	April 5.	53 10

And that, on the 19th of September 1828, the average was fixed at 68s. 6d.; and again, on the 24th of October 1828, at 76s.; that, on the 5th of June 1829, it was fixed at 71s. 5d.; and again, on the 30th of October 1829, at 55s. 4d.; that, on the 6th of August 1830, it was fixed at 74s. 11d.; and on the 17th of September 1830, at 60s. 2d.; and further, that the highest average under the

provisions of the said Act was 76s. 7d., as fixed on the 14th of November 1828; and that the lowest average was 51s. 3d., as fixed on the 19th of October 1832.

2. That it further appears to this House, from the returns of his Majesty's consuls abroad, that the mean price of wheat, at the following times and places, were—

	Dantzic.		Hamburgh.		Leghorn.		Philadelphia.	
	s.	d.	s.	d.	s.	d.	s.	d.
July 1828	24	3	23	0	39	7	29	9
Oct. 1828	56	6	41	8	44	9	37	2
Jan. 1829	59	2	49	7	61	0	53	0
April 1829	43	2	46	11	52	4	51	0
July 1829	36	9	36	11	47	10	42	6
Oct. 1829	38	1	34	6	38	7	35	0
Jan. 1830	29	9	31	3	35	11	36	0
April 1830	33	9	31	0	39	7	0	0
July 1830	43	3	35	2	36	4	34	9
Oct. 1830	39	10	38	7	41	5	33	10
Jan. 1831	47	5	46	9	47	4	38	11
April 1831	48	7	49	0	43	1	47	3
July 1831	45	7	37	6	48	2	34	0
Oct. 1831	41	1	45	0	45	3	35	8
Jan. 2832	42	4	37	10	41	9	35	3
April 1832	38	3	37	10	43	8	33	4
July 1832	42	6	29	3	41	2	40	10
Oct. 1832	30	7	28	4	39	5	36	7
Dec. 1832	29	0	29	3	41	0	38	9

3. That it further appears to this House, from the Returns of his Majesty's Consuls abroad, that the mean prices of Wheat at the following times and places were:—

	Amsterdam.		Rotterdam.		Antwerp.		Havre.		Marseilles.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
July 1828,	30	9	33	4	34	6	50	3	52	0
October 1828,	41	1	54	0	47	10	56	10	60	2
January 1829,	55	0	—		58	10	58	0	63	9
April 1829,	45	8	50	5	55	8	61	10	59	6
July 1829,	45	11	48	11	52	1	60	6	56	11
September or October 1829,	43	2	41	9	51	4	51	3	58	6
January 1830,	—		—		41	1	44	0	57	10
April 1830,	36	0	36	8	40	0	45	8	61	5
July 1830,	41	10	43	2	43	10	47	1	58	7
October 1830,	46	9	48	0	51	5	53	0	59	10
January 1831,	41	1	—		54	5	47	5	52	11
April 1831,	47	3	57	9	52	9	49	0	53	3
July 1831,	41	10	51	4	55	2	50	3	51	7
October 1831,	43	2	50	6	57	0	54	6	58	7
January 1832,	43	5	—		48	0	49	0	60	6
April 1832,	38	3	41	4	47	11	52	1	64	3
July 1832,	44	8	41	6	50	6	52	1	—	
October 1832,	39	9	37	3	43	4	51	6	56	10
December 1832,	38	11	40	4	46	6	48	6	57	6

4. That it further appears to this House that the total quantity of foreign Wheat entered for home consumption under the provisions of the 9th Geo. IV. cap. 60. to the 5th April 1833, has been 4,795,746 quarters 1 bushel; and that the total amount of duty paid thereon has been L. 1,604,190 : 10 : 10; and that the average rate of such duty is 6s. 8¾d. per quarter, or thereabouts. That of the foresaid total quantity were imported :—

	Qrs.	Bushels.		
In 1829,	1,494,381	7	at an average rate of duty of	9s. 4d. per qr.
1830,	1,494,381	7	do.	6s. 7d. do.
1831,	1,088,797	3	do.	4s. 9d. do.
1832,	162,607	7	do.	23s. 9d. do.

5. That of the total quantity of 4,795,746 quarters 1 bushel so entered for home consumption, under the provisions of 9th Geo. IV. c. 60, there were admitted—

Qrs.	Bushels.			
1,571,311	5	at a duty of	1s. 0d.	per quarter.
1,248,687	2	do.	2s. 8d.	do.
564,437	0	do.	6s. 8d.	do.
508,217	7	do.	10s. 8d.	do.
viz.—3,892,653	6	do.	10s. 8d.	do. or under.
903,092	3	do.	13s. 8d.	do. or upwards.

6. That it therefore appears that the supply of foreign wheat afforded to the people of Great Britain, under the provisions of the 9th Geo. IV. c. 60, has been at the rate of 1,008,860 quarters per annum or thereabouts, and that the revenue derived therefrom has been at the rate of L. 337,479 per annum, or thereabouts.

7. That nothing is more injurious to those classes of the community which are engaged in the cultivation of the soil, than great and rapid fluctuations in the value of their commodities.

8. That such fluctuations cannot altogether be prevented in the price of an article, whose production is necessarily affected by the variations in the seasons, but that it does not appear to this House that the existing regulations for the trade in foreign corn have succeeded in diminishing those fluctuations, but that, on the contrary, they have a tendency to aggravate them, by placing occasional and unnecessary obstacles in the way of a free trade in corn with foreign countries.

9. That any disparity between the price of provisions in one country and another, has a tendency to give comparative encouragement to the industry of that country in which the subsistence of man is obtained at the lower rate, and to impose difficulties upon that of the country in which it is obtained at the higher rate.

10. That the price of wheat in Great Britain stands generally at a higher level than in the other countries of Europe, whose inhabitants are engaged in similar pursuits with those of the British Empire.

11. That such higher price, in a great measure, is to be ascribed to the laws which regulate the trade in foreign corn.

12. That the varying scale of duties imposed by the said laws, operate

frequently as a prohibition upon the import of foreign grain, and, consequently, upon the export of British commodities.

13. That, therefore, the manifest effects of the Corn Laws are to leave the agricultural interest exposed to all the difficulties which arise from frequent and sudden fluctuations in price,—to discourage the export, and consequently the production, of British commodities,—to increase the cost of cultivating the soil, and of producing the manufactures of the United Kingdom,—to render the industry of this nation less capable of competing with that of other nations,—and to make the people less competent to support the several burdens which the various exigencies of the State have imposed upon them.

14. That it is therefore expedient to revise the said laws, and to place them upon a footing more consistent with justice, and more conducive to the welfare of the most important interests of the country."

These resolutions are meant to show that the price of grain has fluctuated much in this country, and that these fluctuations are caused by the present corn law.

Now, in the first place, these resolutions prove, that where the present law, which is stigmatised as obnoxious, exists, the extreme fluctuations in the prices of wheat during four years, from 14th November 1828 to the 19th October 1832, did not exceed 25s. 4d. the quarter. It also proves, that the greatest fluctuation exhibited in any one year of the years 1828, 29, 30, 31, 32, 33, did not exceed 21s. a quarter; and that so far back as 1828; but that in the subsequent years, the fluctuation, according to his lordship's own data, has only been 15s. 11d. in 1829, 13s. 1d. in 1830, 11s. 4d. in 1831, 11s. 11d. in 1832, and 1s. 4d. in 1833, the quarter.

In the second place, they prove that in the country whence we obtain the greatest supply of corn, and where this obnoxious and abused corn law does not exist, the price of corn fluctuates to a greater degree than in this country. Thus, in 1828, at Dantzic the price fluctuated 32s. 3d., and at Rotterdam 21s. 4d.; and during four years, from 1828 to 1832, both inclusive, it fluctuated 24s. 9d.

The price of corn, then, fluctuates every where. How can it be otherwise; since the supply of all corn depends on the state of the weather; and in a changeable climate such as ours, astonishment is not excited by prices of grain fluctuating so much as that they fluctuate so little. Is a fluctuation of one-third in price a wonderful circumstance, when a fluctuation in the produce may amount not only to an half, but that half may not intrinsically be worth a quarter?

Thus, in 1815 was an excellent crop of beautiful wheat, at least 4½ quarters per imperial acre. It weighed 63 lb. and upwards per bushel; and so thin was its skin, and so plump the grain, that only half

a stone of bran was obtained from each bushel. In the end of 1815, its selling price in the market at Berwick-on-Tweed was 37s. 4d. per quarter. In May 1816 the same wheat sold for 140s. per quarter! The crop of wheat in 1816 was very scanty in quantity, and bad in quality. It did not exceed two quarters of marketable grain the imperial acre, weighing about 50 lb. the bushel; and yet its price did not exceed 60s. the quarter; and it would not have fetched even that price had the fine wheat of 1815 not existed to mix it with; for it was certainly unwholesome to eat alone, being both malted and frosted before it was cut down. Under such circumstances, is it possible for human ingenuity to contrive a plan to equalize the price of wheat in all the markets of Europe? Lord Fitzwilliam admits, in the eighth resolution "that such fluctuations cannot altogether be prevented in the price of an article, whose production is necessarily affected by the variations in the seasons;" but to get free of this admission, which it would have been disingenuous in him not to have made, he thinks that restrictive regulations in the trade of foreign corn have tended to aggravate them, "by placing occasional and unnecessary obstacles in the way of a free trade in corn with foreign countries." We have already seen that fluctuation to the amount of 21s. 4d. under the highest price of 54s. per quarter, existed one year, 1828, in Rotterdam, the greatest shipping port of a country which admits corn freely; for Holland cannot raise so much corn as her wants require; whereas in France, where a restrictive system in regard to corn exists, his lordship's own table, in the third resolution, shows that at Havre and Marseilles the price of wheat did not fluctuate beyond 14s. 9d. a quarter in four years, from 1828 to 1832, both inclusive. The effects of a free trade in corn would therefore likely be, to conflict a number of fluctuating prices against each other, which, from the nature of things, could never produce a *steady* price; on the contrary, we have seen the more freely the transit of corn is permitted, the more fluctuating is its price. If his Lordship demurs against this conclusion, he must blame his own data for it, not us.

The fourth, fifth, and sixth resolutions, show that the quantity of foreign wheat which have been entered for home consumption under the [illegible] up to 5th April 1833, has been [illegible] at the very trifling duty of 6s. 8$\frac{1}{2}$d. per quarter, and therefore, as that is obviously his Lordship's meaning in making the statement, therefore, all that the law has "*afforded*" of foreign wheat to our population, is only 1,008,860 quarters, and to the value of £. 337,479 a-year. Under this iniquitous law, our population has been starved and our exchequer robbed. therefore away with it!

In these resolutions, though his Lordship has carefully told us that the average duty paid on foreign wheat has not exceeded 6s. 8¾d. per quarter, " or thereabouts," he has omitted to mention whether it was hard cash or manufactures which were exchanged for the 4,795,746 quarters of foreign wheat. As to the small duty, we exclaim with Mr Westlake of Southampton, in his " Practical Remarks on the Corn Laws," " it is astonishing to see men argue, that because the average duty paid on wheat for some years past has been 6s. per quarter, " a *fixed* duty of 6s. would answer every purpose." People who reason on such false premises, should reflect that, during the period they refer to, we have had two deficient harvests, which have caused the aggregate average for six weeks together, in two distinct years, to be upwards of 73s. per quarter,—almost a famine price,—and at which it would be little short of a species of iniquity to tax wheat 6s. per quarter."

As his Lordship, in the twelfth resolution, deprecates the *varying* scale of duties, we may conclude he likes a *fixed* one better. But " there are reasoners," says Sir Charles Dalbiac on the Corn Laws, " who argue that the *duty* on corn must be a *fixed* duty. Aye, this is to be a sovereign remedy for the prevailing distress. But I am bold enough to say, that the *duty* must *not* be a *fixed* duty; because it *cannot* be a fixed duty, unless, indeed, that duty be called *fixed,* which, being settled to-day, may be unsettled to-morrow. Are we permitted to gather the fruits of the earth at *our own will?* Is it given to *man* to command the seasons—to control the dispensations of Providence? Suppose the wisdom of man, during the last session of Parliament, had put a *fixed* duty upon foreign corn. Suppose the judgment of God had visited us with a continuance of the rains which fell in September for a month or five weeks longer, the greater part of the corn in the north of England would have been destroyed, or rendered unfit for use. What *then* would have become of your *fixed* duty. *Then,* indeed, we must have thrown open every port,—perhaps have given a *premium* to importation, in order to have insured subsistence for the coming year; otherwise we might have been exposed to a scarcity bordering upon famine, such as this country was threatened with in 1801."

Sir Charles thus expounds the true principle on which every corn law, wherever it is necessary to have a corn law at all, should be enacted. " I do feel a perfect confidence, that the *great principle* upon which our present corn laws are based,—namely, a graduated scale of duties upon foreign corn, *ascending* in proportion as our home produce *decreases* in price, and *descending* in proportion as our home

duce *increases* in price,—is the *only* sound and wholesome principle, protective to the grower against too great a depression, protective to the consumer against any excess of price."

Maintaining, as we do, the integrity of the *principle* on which our present corn law is based, we hesitate not to state objections to the details of that measure. We have the same objections to those details now, that we had when they were about to be enacted. We think the duty ought to be paid when the foreign corn is imported; but in this particular we are satisfied that the commercial system which extensively permits the bonding of foreign articles in this country free of duty, ought not to be relaxed for the sake of corn. Indeed, it would be invidious to demand an exception in favour of the *trade* in corn. But we are sure the real average of the price obtained for corn throughout the kingdom, would be more accurately ascertained than it is at present, by taking the returns in *every* corn market-town from the farmers *only*. Dealers and millers can only obtain supplies of corn from farmers, and if they make a return of price, it must either be the return upon the same corn which the farmers have already made, or it must be a return through a second sale on the same parcels of grain. When such a practice is permitted, the same parcels of grain may make an indefinite number of returns of price. In this respect wheat is in no better plight than Iago's purse, "'twas mine, 'tis his, and has been slave to thousands;" thus transmuting the "staff of life" into "a rod for the fool's back." Mr Westlake's idea of what the graduating duty should be is the following: "On wheat 22s., when the aggregate average is under 51s.; on barley 10s., when under 31s.; on oats 8s., when under 21s.; lessening the duty on each 1s. per quarter for every 1s. of increase in the average." He adds, "the experience which I have had of the working of the present laws, convinces me of the general fairness of these rates."

Notwithstanding that Mr Westlake feels "perfectly convinced himself, that the idea of fictitious sales having been made to influence the averages under the present system, is in great measure, if not wholly, void of foundation; because, with the exception of wheat, when the averages range between 68s. and 73s., there is absolutely nothing at stake sufficient to excite in men's minds a disposition to defraud,"—in which case, he may truly state the experience of *capitalists* and men of worth, we are persuaded much injustice is nevertheless committed on prices by the credit-speculations of gamesters in corn. Baseless speculators in every thing are soon "frightened from their propriety." Like nervous hypochondriacs, whenever they observe a ten-

dency to a serious depression in the barometer of prices, they become agitated, and descend to the lowest depths of chicanery to affect an artificial rise, and they can easily excite the minds of honest rustics. But whether moneyless speculators attempt or no to affect the price of corn, we cannot refrain from stating the remarkable fact, that during the last seven months, when little has been done in the corn trade, the prices of wheat have varied only 3s. 6d., of barley 6s. 2d., and of oats 2s. 4d., the average of the three being only 4s. a-quarter. Speculation, then, does cause fluctuation in prices.

The direct tendency of the modern economist's free trade in corn, would be to establish a rivalry in condition between the agricultural labourers in this country and the serfs of Poland. So long as the condition of the former continued superior to that of the latter, so long the modern economist ought, in consistency, to demand a free trade in corn; and till that equality of condition between the two states be established, it will be impossible to institute a free trade in corn. Let what delusion may, be practised on the manufacturing population and interest, to confirm them in the belief that cheap corn, as such, could benefit them; the agricultural interest should always bear in mind, that cheap corn, arising from the importation of foreign corn, can never be realised in this country until they are first degraded to the condition of the serfs of Poland; and that, should the theories of modern economists be unhappily put into practice, the inevitable effect will be to sink them as low in poverty and misery as they are. "The hand which throws the shuttle," says Sir Charles Dalbiac, warmly but patriotically, "is as dear to me as the hand which guides the plough; but rest assured, that if ever the time shall arrive when the British farmer—the true British yeoman—shall be reduced to the common level of the serf of Poland, the curse of England will be accomplished, and our general ruin will pay the forfeit."

The rest of the resolutions are merely a string of assertions, in proof of which his Lordship has not condescended to adduce a single fact. We have examined all the *facts* contained in the resolutions, and as these assertions do not form a sequence to the facts, we let them alone, as we do all abstract propositions in modern political economy, which are not applicable to practical purposes.

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at th following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Feb. 1.	56 10	27 4	18 10	36 2	37 0	32 2
8.	57 0	27 2	18 7	34 0	36 0	32 2
15.	55 3	26 6	18 1	34 0	36 0	31 4
22.	54 6	26 2	17 10	33 10	35 10	31 4
Mar. 1.	54 5	27 0	17 11	33 6	35 0	30 0
8.	55 0	27 0	17 7	33 0	33 6	29 10
15.	55 8	27 8	17 10	32 6	33 0	28 10
22.	56 0	27 10	18 0	32 0	33 6	30 1
29.	56 4	28 1	18 0	32 6	33 0	30 4
April 5.	57 8	28 4	18 2	32 0	32 6	29 9
12.	57 2	26 6	18 1	32 2	33 0	30 11
19.	54 0	27 1	17 7	32 0	32 6	31 7
26.	54 7	26 5	18 1	31 6	32 0	30 10

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Ba 9 St.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.
Feb. 2.	25 0	14 0	12 1	8 8	16 8
9.	25 7	13 5	11 10	8 2	16 7
16.	25 1	12 8	11 10	8 6	16 6
23.	25 4	12 8	12 0	8 2	16 3
Mar. 4.	25 4	13 2	12 2	8 6	16 4
11.	25 5	13 0	12 0	8 6	16 0
18.	25 5	12 10	12 0	8 5	15 10
25.	25 6	12 10	11 6	8 6	15 8
April 2.	25 6	13 4	11 8	8 8	15 8
9.	26 9	14 6	12 6	8 6	15 9
16.	26 2	13 7	12 6	8 4	15 10
23.	26 10	15 10	13 10	8 9	16 2
30.	27 0	16 0	14 0	9 0	16 8

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Feb. 5.	50 9	29 6	17 7	35 6	36 6	35 8
12.	49 2	31 9	16 8	34 0	36 0	35 0
19.	49 3	28 4	16 5	33 6	35 10	35 3
26.	48 0	29 7	16 9	33 6	35 6	34 6
Mar. 5.	49 6	27 6	16 9	29 6	33 6	33 7
12.	50 1	28 5	17 1	30 6	34 6	34 4
19.	49 8	31 4	16 10	30 0	33 0	33 10
26.	49 2	29 8	16 8	30 0	32 6	34 3
April 1.	48 6	28 6	16 7	32 0	33 0	31 10
8.	49 7	28 8	16 8	31 6	32 6	34 1
15.	48 6	27 0	16 5	31 0	32 0	32 0
22.	49 10	29 4	16 6	32 0	32 6	31 9
29.	48 10	29 3	16 2	32 0	33 6	33 1

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.
Feb. 6.	52 0	27 9½	19 5	29 6	28 0
13.	53 0	27 0	19 10	29 8	28 6
20.	52 8	29 7½	19 6½	29 0	28 8
27.	51 10½	28 2½	19 4	29 6	28 2
Mar. 6.	51 0	27 2½	19 0	28 6	27 10
13.	51 7½	32 0	19 0	28 0	27 6
20.	53 11	28 7	19 7	28 6	27 6
27.	56 0	31 9	20 10	28 6	28 0
April 3.	56 9	31 0	20 7	28 0	27 10
10.	56 6	32 6	21 0	29 0	28 6
17.	57 6	32 0	20 9	30 0	29 6
24.	58 4	33 2	19 11	30 6	30 0
May 1.	58 6	32 9	20 4	30 0	28 9

TABLE showing the Weekly Average Prices of GRAIN, made up in terms of 7th and Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIG CORN; the Duties payable thereon, from 1st February to 1st May 1833.

Date.	Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
Feb. 1.	53 3	52 11	34 8	27 6	27 11	21 4	17 2	17 6	21 3	35 2	32 8	21 3	36 0	38 5	12 6	30 9	31 10	
8.	53 0	52 11	34 8	27 2	27 8	21 4	17 1	17 4	21 3	33 3	32 11	21 3	35 2	37 10	14 0	30 6	31 4	
15.	52 3	52 10	34 8	26 7	27 4	21 4	16 8	17 1	21 3	34 3	33 5	19 9	35 4	37 1	14 0	30 6	31 0	
22.	52 1	52 9	34 8	26 3	27 1	21 4	16 8	17 0	21 3	33 2	33 8	19 9	33 11	36 4	15 6	30 1	30 9	
Mar. 1.	52 3	52 8	34 8	26 4	26 10	22 10	16 6	16 10	22 9	29 0	33 1	19 9	33 0	35 2	16 9	29 4	30 4	
8.	52 2	52 6	34 8	26 5	26 8	22 10	16 6	16 9	22 9	32 4	32 10	21 3	32 8	34 4	18 3	29 3	30 0	
15.	52 6	52 4	34 8	26 6	26 6	22 10	16 6	16 8	22 9	30 0	32 0	21 3	32 3	33 8	19 9	29 1	29 9	
22.	52 10	52 4	34 8	26 3	26 4	22 10	17 0	16 7	22 9	33 0	31 11	22 9	32 3	33 2	19 9	29 7	29 7	
29.	53 5	52 6	34 8	27 0	26 5	22 10	16 11	16 8	22 9	31 10	31 6	22 9	32 0	32 8	21 3	29 6	29 5	
April 5.	53 10	52 10	34 8	27 1	26 7	22 10	16 10	16 8	22 9	32 11	31 6	22 9	32 10	32 6	21 3	29 10	29 5	
12.	53 8	53 0	33 8	26 5	26 7	22 10	16 11	16 9	22 9	30 7	31 9	22 9	32 0	32 4	21 3	30 0	29 6	
19.	53 5	53 3	33 8	26 4	26 7	22 10	16 10	16 10	22 9	32 11	31 10	22 9	31 8	32 10	21 3	30 2	29 8	
26.	53 0	53 4	33 8	26 0	26 6	22 10	16 10	16 10	22 9	30 0	31 10	22 9	30 5	31 0	22 9	30 4	29 11	

MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof: from 1st February to 1st May 1833.

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
3. th ag	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
l.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
. .	1,230 5	53 3	1,284 0	64 1	6,292 2	6,356 3	518,055 0	20,262 2	538,317
. .	129 1	..	129 1	..	..	..	17,592 2	..	17,592
. .	850 0	..	850 0	418 2	..	418 2	215,587 6	..	215,587
. .	..	..	..	..	..	..	4,929 3	..	4,929
. .	673 1	..	673 1	262 7	..	262 7	3,453 7	..	3,453
. .	..	..	..	10 0	..	10 0	20,927 4	..	20,927
ls, .	2,882 7	53 3	2,936 2	755 2	6,292 2	7,047 4	780,545 6	20,262 2	800,808
l.									
. .	..	148 2	148 2	2 7	2,061 1	2,064 0	516,565 6	17,957 3	534,613
. .	7 7	..	7 7	..	..	..	17,100 5	..	17,100
. .	10 4	..	10 4	..	..	..	215,500 4	..	215,500
. .	0 6	..	0 6	..	..	..	4,930 1	..	4,930
. .	311 3	..	311 3	1,723 1	..	1,723 1	1,919 5	..	1,919
. .	..	..	..	..	..	..	20,927 4	..	20,927
ls, .	330 4	148 2	478 6	1,726 0	2,061 1	3,787 1	777,034 1	17,957 3	794,991
l.									
. .	1,425 6	141 2	567 0	7 2	3,061 6	3,069 0	514,417 2	13,728 2	528,145
. .	0 4	..	0 4	0 4	..	0 4	17,085 5	..	17,085
. .	0 2	..	0 2	33 6	..	33 6	212,000 3	..	212,000
. .	..	..	..	..	..	..	5,059 0	..	5,059
. .	47 7	..	47 7	40 3	..	40 3	1,917 1	..	1,917
. .	0 3	..	0 3	0 3	..	0 3	20,477 4	..	20,477
s, .	1,474 6	141 2	1,616 0	82 2	3,061 6	3,144 0	770,956 7	13,728 2	784,685

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
h s	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
l.	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	wt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. l
. .	73 3 4	8,276 2 24	8,350 2 0	27 2 15	3,595 3 1	3,623 1 16	525,863 1 12	18,279 3 7	544,143 0 1
, .	0 0 19	..	0 0 19	0 0 19	..	0 0 19	..	82 2 11	82 2 1
s, .	73 3 23	8,276 2 24	8,350 2 19	27 3 6	3,595 3 1	3,623 2 7	525,863 1 12	18,362 1 18	544,225 3
l.									
. .	94 3 15	9,935 1 10	10,030 0 25	87 1 0	3,892 2 2	3,979 3 2	526,300 1 24	22,904 0 26	550,204 2 2
, .	..	..	..	..	..	..	..	82 2 11	82 2 1
s, .	94 3 15	9,935 1 10	10,030 0 25	87 1 0	3,892 2 2	3,979 3 2	526,300 1 24	23,986 3 9	550,287 1
.									
. .	7,857 1 7	259 0 19	8,116 1 26	105 3 12	2,041 1 15	2,147 0 27	523,712 1 27	21,873 0 13	545,585 2 1
, .	12 0 5	..	12 0 5	..	..	..	12 0 5	82 2 11	94 2 1
s, .	7,869 1 12	259 0 19	8,128 2 3	105 3 12	2,041 1 15	2,147 0 27	523,724 2 4	21,955 2 24	545,680 1

PRICES of BUTCHER-MEAT.

Date.	Smithfield, *Per Stone of* 14 lb.		Morpeth, *Per Stone of* 14 lb.		Edinburgh, *Per Stone of* 14 lb.		Glasgow, *Per Stone of* 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
Feb.	6/6 @ 7/6	6/6 @ 7/9	6/6 @ 7/	6/6 @ 7/6	5/6 @ 6/9	6/ @ 6/6	6/6 @ 7/	6/ @ 7/
Mar.	7/ 8/	7/ 8/	7/ 8/	6/9 8/	6/ 7/	6/6 7/6	6/9 7/6	6/6 7/6
April	6/9 7/9	6/6 8/	6/9 8/	7/ 8/	6/6 7/6	6/6 7/9	6/9 7/9	6/6 7/9

PRICES of English and Scotch WOOL.

English, per 16 lb.—*Merino*, Washed, 22/6 @ 27/8; in Grease, 16/ @ 20/.—*South Down*, 16/ @ 22/; *Leicester*, 17/ @ 20/6; Ewe and Hog, 16/ @ 18/.—Ewes, 14/ @ 16/.—*Lecks*, 11/ @ 12/; *Moor*, Ewe and Hog, 7/6 @ 8/6.

Scotch, per 24 lb.—*Leicester*, 28/ @ 30/; Ewe and Hog, 24/ @ 26/.—Ewe, 21/ @ 24/.—*Cheviot*, White, 23/ @ 25/6; Washed, 16/6 @ 19/; Laid, 14/6 @ 15/6.—*Moor*, White, 12/ @ 13/6 Laid, 9/6 @ 10/6.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of April 1832, *and 5th of April* 1833, *shewing the Increase and Decrease on each head thereof.*

	Quarters ended April 5.		Increase.	Decrease.	Years ended April 5.		Increase.	Decrease.
	1832.	1833.			1832.	1833.		
	£	£	£	£	£	£	£	£
Customs, . .	3,460,678	3,417,250	..	43,628	15,084,207	15,516,254	432,047	..
Excise, ...	2,634,220	2,600,575	..	33,645	14,602,488	14,623,576	21,088	..
Stamps, . . .	1,606,114	1,584,038	..	82,076	6,622,238	6,433,268	..	188,970
Post-Office,	348,000	346,000	..	2,000	4,988,413	5,003,855	15,443	..
Taxes, ...	449,593	509,563	59,970	..	1,400,006	1,321,000	..	70,006
Miscellaneous,	7,141	16,478	9,337	..	66,891	69,190	2,799	..
			69,307	161,349			471,377	258,976
	Deduct Increase, . .		..	69,307	Deduct Decrease, .		258,976	
	Decrease on the quarter,		..	91,042	Increase on the year,		212,401	

FIAR PRICES of the different COUNTIES of SCOTLAND, for Crop and Year 1832, *both by the Imperial and Local Measures, the Old Measure varying in different Counties.*

ABERDEENSHIRE.

	Imp. Qr.	Boll.
Wheat, with fodder, . . .	57/	35/1
——— without fodder, .	50/	30 10
Barley, without fodder, .	24/10	20/
——— with fodder, . .	28/6½	23/
Bear, without fodder, . .	23/7	19/
——— with fodder, . . .	27/	22/
Oats, Potato, without fodder,	17/9	14/3
——— with fodder, .	22/0	17/9
White, without fod.,	16/2	13/
——— with fod., .	20/6	16/6
Pease, ...	23/	14/2
Beans, ...	23/	14/2
Malt and Duty, ...	45/	27/9
Oatmeal per Boll, 140 lb, .	12/	

ARGYLESHIRE.

	Imp. Qr.	Lin. Boll.
Wheat, ...	28/	21/
Oats, ...	19 4	14 6
Beans, ...	27/4	20 6
Oatmeal per Boll, 140 lb,		

AYRSHIRE.

	Imp. Qr.	Ayr Boll.		Win. Bush.
Wheat, . . .	50/4	34/5	4	do. do.
Barley, ...	28/10	28/	8	do. do.
Bear, ...	24/8½	24/		do. do.
Oats, ...	15/11	15/6		do. do.
Pease and Beans,	29/7	14/9½	4	do. do.
Oatmeal, per Boll. 140 lb,		13/5½		

BANFFSHIRE.

	Imp. Qr.	Banff Boll.
Wheat, ...	44/8	24/1½
Barley, with fodder, . . .	27/0	21/2½
——— without fodder, .	23/4	18/4
Bear. First, with fodder, .	26/8	20/10
——— without fodder,	23/	18/0
—— Second, with fodder, .	24/8	19/5
——— without fodder,	21/	16/6
Oats, Potato, with fodder, .	22/0	17 4
——— without fodder,	17/6	13/9
—— Common, with fod., .	19/10	15/7
——— without fodder,	13/4	12/0½
Pease, ...	22 6	12/2
Beans, ...	21/6	11/7
Oatmeal per Boll, 140 lb, .		12/6 Sal. D.

BERWICKSHIRE.

	Imp. Qr.	Boll.
. . . . .	46/2	23/1 4 Bush.
erse, ...	25/8	19/3 6 Bush
ammermuir, . .	23/2	17/1½
se, ...	18/6	13/10½
mermuir, . .	17/10	13/4½
r boll, 14 bushels,	26/6	19/8½
per Boll, 140 lb,		13/6½

BUTESHIRE.

	Imp. Qr.	Boll.
. . . . .	48/9	23/10
. . . . .	30/10	30/3
. . . . .	27/6	27/0
. . . . .	18/	17/8
. . . . .	30/	14/9
. . . . .	29/4	14/5
per 140 lb, . . .		14/

CAITHNESS.

	Imp. Qr.	Boll.
. . . . .	19/5	15/3
ato, ...	17/8½	14/
ly Angus, . . .	16/5½	13/
ck, ...	11/5	9/
per 140 lb, . . .		14/ 8½ St.

CLACKMANANSHIRE.

	Imp. Qr.	Boll.
. . . . .	50/6	25/3
erse, ...	31/2	24/0
ryfield, . . .	29/3	22/6
se, ...	19/9	14/9
field, ...	19/8	13/6
l Beans, . . .	31/6	17/
. . . . .	51/4	28/0
per Boll, 140 lb,		14/5 8 st. D.

DUMBARTONSHIRE.

	Imp. Qr.	Boll.
. . . . .	51/1	25/6
. . . . .	29/10½	23/10
. . . . .	27/5½	21/11
. . . . .	18/7	14/10
Beans, ...	31/4½	15/8
per 140 lb, . . .		14/8

DUMFRIESSHIRE.

	Imp. Qr.	Boll.
. . . . .	52/0	25/11½
. . . . .	27/2	19/9½
. . . . .	22/8	16/6
ato, ...	17/	12/4½
ite, ...	16/1½	11/9
. . . . .	24/	11/11½
. . . . .	30/4	15/1½
. . . . .	37/4	18/7½
. . . . .	60/	30/
per 140 lb, . .		12/8

EDINBURGH.

	Imp. Qr.	Boll.
'irst, ...	48/11	24/5½
econd, ...	45/1	22/6
'irst, ...	29/1	21/1½
econd, ...	25/1	18/3
'hird, ...	20/11½	15/3
st, ...	18/10½	13/9
econd, ...	16/1½	11/9
l Beans, ...	26/0½	13/
per Boll, 112 lb, .	11/1	13/8 140 lb

FIFESHIRE.

	Imp. Qr.	Boll.
White, ...	48/8½	24/6
ted, ...	46/8½	23/6
. . . . .	26/6½	19/5½
. . . . .	24/6½	18/
. . . . .	19/4½	14/2½
l Beans, ...	22/10½	16/11
. . . . .	27/1	19/10½
. . . . .	49/8½	25/
) lb, ...	28/4	14/2
easure, ...	26/4	13/2

FORFARSHIRE.

	Imp Qr.	Bolls.
Wheat, ...	53/0	27/4
Barley, ...	26/9	20/2
Bear, ...	23/5	17/9
Oats, Potato, ...	20/7	15/6
—— Common, ...	18/7	14/
Pease and Beans, ...	25/3	13/0½
Rye, ...	27/6	14/2½
Oatmeal, per Boll, 140 lb, .		14/5

HADDINGTONSHIRE.

	Imp. Qr.	Boll.
Wheat, First, ...	53/11	26/11½
—— Second, ...	50/3½	25/1½
—— Third, ...	46/11½	23/5
Barley, First, ...	31/4	22/10
—— Second, ...	29/6½	21/2
—— Third, ...	26/10½	19/7
Oats, First, ...	21/0½	15/4
—— Second, ...	19/9½	14/4
—— Third, ...	18/9	13/8
Pease and Beans, First, .	25/6	12/9½
—— Second, .	24/6½	12/3
—— Third, .	22/3	11/2

INVERNESS.

	Imp. Qr.	Boll.
Wheat, without fodder, . .	46/6	23/6
—— with fodder, . . .	51/0	26/
Barley, without fodder, . .	27/0	20/8
—— with fodder, . . .	30/0	22/11
Bear, without fodder, . .	23/	17/7
—— with fodder, . . .	26/6	19/10
Oats, White, without fodder,	17/6	16/10
—— with fodder,	21/6	20/6
—— Black, without fodder,	8/	7/10
—— with fodder, .	11/	10/8
Pease, without fodder, . .	28/	14/3
—— with fodder, . . .	34/0	17/4
Beans, without fodder, . .	28/	14/3
—— with fodder, . . .	33/	16/9
Rye, without fodder, . . .	28/	14/3
—— with fodder, ...	33/	16/9
Oatmeal, White Oats, 140 lb,	12/4	17/ 9 st. D.
—— Black Oats, . . .	15/6	15/ do.

KINCARDINE.

	Imp. Qr.	Boll.
Wheat, with fodder, . . .	58/6	29/3
—— without fodder, . .	51/	25/6
Barley, with fodder, . . .	30/11	22/6
—— without fodder, . .	26/3	19/1
Bear, with fodder, . . .	27/11	20/5
—— without fodder, . .	23/3	16/11
Oats, Potato, with fodder, .	25/	18/2
—— without fodder,	19/6	14/3
—— Common, with fodder,	22/6	16/4
—— without fod.	17/	12/5
Pease, with fodder, . . .	31/6	15/9
—— without fodder, . .	24/	12/
Beans, with fodder, . . .	32/6	16/3
—— without fodder, . .	25/	12/6
Oatmeal, per 140 lb, . . .		14/3

KIRKCUDBRIGHT.

	Imp. Qr.	Boll.
Wheat, ...	51/4	68/4 11 Win Bush.
Barley, ...	27/2	36/ .. ..
Bear, ...	24/	32/ .. ..
Oats, Potato, . . .	16/4	22/ .. ..
—— Common, . . .	14/6	19/ .. ..
Oatmeal, per Boll, 140lb,	12/1	24/2 16 Stone.

KINROSS.

	Imp. Qr.	Boll.
Wheat, ...	47/	23/6
Barley, First, ...	25/8	18/6
—— Second, ...	23/	16/9
Bear, First, ...	20/6	15/
—— Second, ...	18/6	13/6
Oats, White, First, . . .	18/9	13/8
—— Second, . .	16/	11/8
—— Black, First, . . .	15/6	11/3
—— Second, . . .	13/	9/8
Pease and Beans, ...	21/6	10/9
Malt and Duty, ...	49/	35/6
Oatmeal, per 280 lb, . . .	27/8	13/10

LANARKSHIRE.

	Imp. Qr.	Boll.
Wheat, First,	49/4	24/7½
——— Second,	47/6	23/8½
Barley, First,	27/8	20/1½
——— Second,	25/2	18/3½
Bear, First,	23/	16/9
Bear, Second,	22/6	16/4½
Oats, Best,	17/0½	12/5
Pease,	29/8	14/9½
Beans,	32/	15/11½
Malt and Duty,	51/8	37/6
Oatmeal, per Boll, 140 lb.		13/9½

ARCHBISHOPRIC OF GLASGOW.

	Imp. Qr.	Boll.
Barley,	32/6	23/8
Oats,	18/9	13/8
Meal,		14/2
Malt,		14/6

LINLITHGOW.

	Imp. Qr.	Boll.
Wheat,	49/4	24/7½
Barley,	28/8	20/10
Oats,	17/10	13/
Pease,	26/8	13/3½
Malt,	49/4	35/11
Oatmeal, per Boll, 112 lb,	10/10	13/5½

MORAY AND ELGIN.

	Imp. Qr.	Boll.
Wheat,	46/4½	24/6
Barley,	26/3½	20/2½
Oats,	17/2½	18/
Rye,	27/5½	14/4
Pease and Beans,	38/8½	20/6
Oatmeal, per Boll, of 112 lb,	12/9½	15/11½

NAIRNSHIRE.

	Imp. Qr.	Boll.
Wheat,	44/	25/5
Barley, without fodder,	26/6	20/4
——— with fodder,	29/6	22/8
Oats, without fodder,	18/6	14/2
——— with fodder,	22/6	17/2
Oatmeal, per Cwt., 112 lb,	11/8½	14/7 140 lb

PEEBLESSHIRE.

	Imp. Qr.	Boll.
Wheat, First,	54/6	27/2
——— Second,	50/1	25/
——— Third,	45/7	22/9
Barley, First,	29/	21/1
——— Second,	27/1½	19/9
——— Third,	25/9	18/9
Bear, First,	24/	17/6
Second,	23/4	17/
Third,	22/8	16/6
Oats, First,	17/2	12/6
——— Second,	15/5	11/3
——— Third,	14/5	10/6
Pease, First,	27/2	13/7
——— Second,	25/1	12/6
——— Third,	19/6	9/9
Oatmeal, First, per Boll, 200lb,	26/9½	13 4½ 140lb
——— Second,	25/8½	12/10½
——— Third,	24/9½	12/4½

PERTH.

	Imp. Qr.	Boll.
Wheat, First,	55/2	27/6½
——— Second,	50/2	25/½
Barley, First,	27/1	19/8½
——— Second,	24/1	17/6½
Oats, First,	19/6	14/2½
——— Second,	16/	11/8
Pease and Beans,	22/9	11/4½
Oatmeal, per Boll, 140 lb.		

RENFREWSHIRE.

	Imp. Qr.	Boll.
Wheat, First,	52/7	26/3
——— Second,	51/4½	25/8
Barley, First,	33/4½	19/3
——— Second,	33/1	19/1
Bear, First,	31/7½	25/
——— Second,	31/	24/6
Oats, First,	20/4	16/0
——— Second,	18/11½	14/11½
Beans, First,	32/1½	18/7
——— Second,	31/3	18/1
Oatmeal, per Boll, of 140 lb,		14/7

ROXBURGHSHIRE.

	Imp. Qr.	Tiviot Boll.
Wheat,	49/4	32/
Barley,	25/4	24/
Oats,	18/9	17/8
Pease,	27/4	17/9
Beans,	28/	18/2
Rye,	25/4	16/5
Oatmeal, 140 lb,		14/

ROSS AND CROMARTY.

	Imp. Qr.	Boll.
Wheat,	46/2½	22/10
Barley,	27/10½	20/10
Bear,	24/	18/
Oats, Potato,	16/5	12/3
——— Common,	16/	12/
Pease,	25/4	14/2
Beans,	26/	14/6
Oatmeal, per Boll, 140 lb,	13/11	15/9½ 8St.

SELKIRKSHIRE.

	Imp. Qr.	Old Boll.
Wheat,	48/8	29/6
Barley,	5?/	24/1
Oats, Potato,	18/4	17/
——— Common,	17/	15/3½
Pease,	27/8	16/9½
Oatmeal, per 140 lb,		13/3½

STIRLINGSHIRE

	Imp. Qr.	Stirling Boll.
Wheat,	50/	25/
Barley, Kerse,	30/	23/1
——— Dryfield,	28/8	22/
Oats, Kerse,	18/4	14/2
——— Dryfield,	18/	13/10
——— Muirland,	15/4	11/10
Pease and Beans,	27/6	13/9
Malt,	52/	40/
Oatmeal, per Boll, 140 lb,		13/9

SUTHERLANDSHIRE.

	Imp. Qr.	Boll.
Wheat,	48/	24/
Barley,	27/	20/8
Bear,	24/	18/
Oats, Potato,	22/	16/6
——— Common,	18/	13/6
Pease,	30/	15/
Oatmeal, per Boll, of 140 lb,		16/6

WIGTONSHIRE.

	Imp. Qr.	Lin. Boll.	
Wheat,	48/	24/	8 Win. Bush
Barley,	27/	19/8	12 Win. Bush
Bear,	22/8	16/6	.. ..
Oats, Potato,	14/10	10/9½	.. ..
—— Common,	13/10	10/2	.. ..
Rye,	24/	17/6	12 ..
Malt,	54/	27/	8 ..
Beans,	28/	14/	.. ..
Pease,	28/	14/	8 Win. Bush
Oatmeal, 140 lb.		14/6	

We may inform our English readers, that the Fiar Prices are the average prices of grain, as ascertained every year by the verdicts of Juries in every county of Scotland. These Juries are summoned in spring, and ascertain, from the evidence produced to them, the average prices of the preceding crop. By these prices, rents payable in grain and similar contracts, are generally determined; the main object is to convert into money the stipend (for the most part fixed at a certain quantity of grain) of the Scottish clergy.

FOREIGN CORN MARKETS.

THE Foreign Corn Trade has been depressed in a similar manner to our home trade for the last six months, though the navigation of the Baltic has been more than usually open this winter. The importation of foreign corn has, therefore, been very trifling up to the end of April. The quantities entered for home consumption have also been trifling, so that what remains in warehouse is considerable:—784,685 quarters 1 bushel of all kinds of grain, and 545,630 cwt. of flour and oatmeal. The slight diminution in the quantities remaining in warehouse over what have been entered for home consumption, must be accounted for by exportation. Attempts, we believe, are making by the millers to be allowed to grind foreign wheat and export the flour. In so far as the scheme would give employment to our mills it would be unobjectionable; but how could fraud be guarded against, unless mills were licensed to grind for the foreign market, and be under the surveillance of excisemen, in the same manner as many distilleries in Scotland are licensed to distil for the English market.

The following are a few quotations from abroad, taken from that excellent paper Mr Isaac Dimsdale's Universal Corn Reporter, of Savage Gardens, London,—a paper exceedingly neat, and correctly got up, and indispensable, we should conceive, to every corn merchant.

"DANTZIG, 18*th February*.—The navigation of the Vistula still continues closed, although the weather is mild, and forebodes an early spring. Our prices, which remain nominally the same, the best wheat 35s. per quarter, depend entirely on the continuance of winter; for as soon as we receive the contemplated Polish supplies they must decline.

"*4th March*.—The mildness of the weather has caused the ice to give way in the Vistula, and we expect in a week it will be clear enough for shipments to take place. The river Bug has also broken up, and it is said to have a good body of water, but the thaw having set in so suddenly it is apprehended that many of the barges will not have been in time to start immediately, and thence be prevented getting down, as the water may run off too quickly. We had anticipated considerable supplies from this quarter whence the transports last year were prevented, owing to the want of water, but it is now feared by some, that we shall have to rest principally on the supplies from the Vistula. As the ice this year has moved fully three weeks earlier than usual, arrivals, or course, may be expected so much the sooner, which ought to actuate speculators accordingly in transmitting orders.

"*21st March*.—The Vistula is now open, but no ships have arrived, as the wind has remained contrary. To-day we have again frost and snow, which prevent the supplies from coming down from the interior.

25th April.—At the close of last year our stocks of grain in our warehouses were ascertained to amount to 9300 lasts of wheat, 170 of rye, 30 of barley, and 80 of oats. During winter the trade has not been without activity, for purchases to the extent of 20,000 to 25,000 quarters of wheat, have in succession been effected for Foreign and British account, at 30s. to 32s. for good and mixed, and from 35s. to 38s. free on board, for the highest mixed samples. Great apprehensions were entertained that, similar to the two last years, the small rivers in Poland would not be navigable this season, and that the bulk of supplies would again be withheld from us; fortunately, however, our fears are dissipated; some few arrivals have already reached us, and there is also every reason to believe that the remainder of the supplies will also come forward in the course of next month. We have, however, heard this week that 140 barges are detained in the upper districts of the Bug from the want of water, having on board from 35, to 40,000 quarters of wheat: if they are

eventually prevented from arriving at our market, it may materially affect the prices. All the northern countries had failing crops last year. Poland, whose soil and climate are so peculiarly favourable to the wheat plant, has been less unfortunate; still the crops have also yielded under an average in quantity; the latter moreover, being still further reduced, by the proportion of land which was out of tillage, in consequence of the late revolution. We compute the quantity of wheat which is likely to reach us from that country till August, not to exceed 8 or 10,000 lasts, and if it be taken into consideration that our own country wheat is almost unfit for shipment to England, and that all the lower ports of the Baltic have nothing better to offer, it becomes evident that the resources for real sound heavy wheats, are unusually limited. To this peculiar circumstance it must be attributed that our prices have maintained themselves so high until now, and we do not see a likelihood of their experiencing any material decline; indeed, if the prospects for the next crop do not prove very favourable, an advance on our present rates must be anticipated. A very superior quality of flour is now prepared here, which may be shipped at 19s. per barrel, of 196 lb. nett, free on board, ship biscuits at 9s. per cwt., cabin bread at 10s. 6d. per cwt., including cost of bags. Freight very moderate, and likely to run low,—at the moment fine vessels might be had for London or the east coast, at 3s. 6d. per quarter of wheat in bulk.

"*Konigsberg, 16th February.*—Our prices remain nominally the same, and, contrary to anticipation, the late crops have turned out deficient in their produce, and the quality inferior, indeed fine samples are very scarce, and we fear little good wheat will be obtained for shipment in spring. The supplies of grain from the farmers have not, for many years, been so limited as those this season; and since the commencement of this month, they have almost entirely ceased, and the little that has gone to granary, is not more than requisite for our own consumption.—23d April. Such a spring as this, as to business, recollecting also it is the commencement of the shipping season, has not, for many years, been experienced in time of peace. There are scarcely three or four ships loading here and at Pillau, and usually we have a couple of hundred at the corresponding period of former years. In fact, we have no demand for wheat or any other article. The farmers in the neighbourhood only come to purchase their summer seed, particularly the different kinds of pulse, for sowing. The supplies from Poland of wheat and seed are expected to be only to a limited extent.

"*Rostock, 29th April.*—As the farmers have been engaged in their out-door labours, the supplies of grain have been extremely limited, and best qualities of wheat cannot be purchased under 26s. 6d.; and the farmers are generally holding for higher rates, even for inferior parcels, some few orders having been received from England, which have given a firmness to the trade.

"*Odessa, 29th February.*—A society has been established here for opening a regular weekly communication with Constantinople by steam-vessels. Three steam-boats are to be built, two to ply between here and Constantinople, and the other vessel through the Bosphorus, or to assist them if a-ground or in distress. In the Black Sea there have been several shipwrecks, we hear thirty ships have been lost, principally laden with wheat and silk, and which had left Odessa at the close of last season. The fourth of them have totally perished, both lives and merchandise."

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ON THE EDUCATION OF THE LABOURING CLASS.

By Mr WILLIAM HAWKINS, Hitchin, Hertfordshire.

IN common with the rest of the public, I expected from the present Government the establishment of a system of National Education. When the Chairman of the Committee of the Society for diffusing Knowledge became Chancellor, and the Vice-chairman a Cabinet Minister, it seemed difficult to expect too much. We were like the Venetians, when a countryman of their's became Pope: "Aye, aye," said they to one another, "we shall have as many cardinals' hats as we like, now, *for we have got the hatter.*" But we have been disappointed. The "hatter" has declared his intention to do nothing for us, and it therefore becomes us to do what we can for ourselves. I do not hesitate to avow, that I consider the establishment of a good system of popular education to be beyond comparison the most important benefit which it is within the competency of a government to bestow on a people; and I propose, therefore, in this paper, to state a few of the considerations which, as it appears to me, do demonstrate its utility, and ought to secure its adoption.

When, about fifty years ago, the question of teaching the

people to read and write was agitated, there were many timid minds who feared its perversion to bad ends, and therefore consistently opposed it; but that question is decided, theoretically and practically—the irrevocable decree has gone forth—and the two great parties in the state are emulating each other in zeal for its execution. Henceforth we have to deal with a people that can read. Hostility to the farther progress of education can arise only from a supposition that its promoters have in view objects other than those which they choose to avow, or that some certain mischievous consequences will spontaneously and inevitably arise from it. No man will venture to profess himself opposed to the diffusion among mankind of higher intelligence or purer morality. Much injury to the cause has been done from confounding the means of attaining those noble ends with the ends themselves. We hear arguments, or rather disputes, which presuppose that the parties to them consider the power to read and write as education! which is just as reasonable as to take the ladder for the fruit which it enables us to reach. We hear people, and even judges of the land, gravely inquiring whether education *has* improved the condition of the people, whereas upon a large scale it has never been tried. In the bulk of our elementary schools there is nothing usually attempted beyond reading, writing, and the simpler rules of arithmetic. If the master succeeds in imparting to the boys a moderate facility at these three arts, he does all he undertakes, "*nec amplius scit aut potest.*" The boys' education is then complete,—they leave school without improvement in morals, and without knowledge, or the available means of getting any, and in a short time must lose, from disuse, the powers which they had acquired. It must be intuitively obvious, that this sort of education (supposing it to stop here), can have very little effect upon the character, good or bad; and yet it is from the conduct of men so brought up that arguments have been drawn unfavourable to the cause of mental culture! And the finger is pointed in derision to our crowded jails and swelling calendars, as if the bulk of the wretched criminals were, in a fair sense, men of education! And this does not arise from wilful misrepresentation, but simply from confusion of ideas,—from calling that knowledge which is not knowledge,—from putting darkness

for light and light for darkness. It is, therefore, most incumbent on the friends of human improvement, to remove this misconception, and to state clearly what they mean by education, and what are the consequences which they expect from it.

In treating of this subject, it has not been unusual to divide it into two parts, that which regards the moral character, and that which regards the temporal condition of the people; and the advocates of education frequently urge the inculcation of moral qualities, such as industry, frugality, and temperance, *as the means* of increasing the physical enjoyments of the people; whereas I conceive it would be more philosophical to look upon the advancement of the people in knowledge and virtue as the paramount object,—an object to be desired and contended for, even though it had detracted from our worldly enjoyment as much as it really adds to it,—not that a wise man should undervalue the latter objects, but that wherever they clash, he should make it give place to the higher and the nobler one. There is undoubtedly an exact and uniform agreement between virtue and happiness, as it would be easy enough to prove a *posteriori*, but that is unnecessary; for there are certain *a priori* considerations from which we may logically assume it, from reflecting on their mutual harmony, which observation shews us to exist amongst the laws of the moral world. The enjoyment of happiness and the acquisition of virtuous habits being two leading objects of our creation, it would be jarring and incongruous to suppose that an approach towards one of them was a departure from the other. To acquire the character, and to practise the virtue, inculcated by divine authority, requires much mental labour, much reflection upon the operations of our own minds, much abstraction from the objects of sense, much thought upon the absent, the future and the invisible, a much more intellectual life, in short, than the bulk of the people are now accustomed to. The exercising of ourselves in these duties from proper motives, is, in itself, the highest style of virtue, and will confer the highest species of temporal happiness, if the laws of nature be in harmony with each other, for our desire of happiness and our admiration of virtue would otherwise conflict with each other; and the same harmony amongst the laws of the moral world, which leads us to conclude that virtue must be

favourable to happiness, requires us also to admit that knowledge has a tendency to promote them both. There is indisputably implanted in our minds a thirst for knowledge,—a desire which rests upon the acquisition of knowledge as its aim and object, without reference to any ulterior use to which that knowledge may be turned. From observing the many incidental uses which have been made of knowledge, acquired sheerly from the love of it, as, for instance, the improvement in navigation, flowing from the discovery of the moons of Jupiter, it might not perhaps be very unreasonable to infer that the improvement of the temporal condition of mankind was the final cause of this acknowledged thirst for knowledge; but a doubt may well be suggested, whether the avidity with which the mind receives whatever knowledge is presented to it be not too great to be accounted for in this manner? and whether we may not, under the guidance of this instinct, be unconsciously making preparation for the state on which we shall enter when we have "shuffled off this mortal coil?" And if that should be the case, it would be in perfect analogy to the manner in which the actions, both of men and of the lower animals, are controlled and directed to ends, and by a power of which they are totally unconscious at the time.

These are considerations of vast moment,—too serious, perhaps, to be introduced into a paper like this; but it is impossible to advocate reasonably the promotion of human intelligence, if we leave out the principal reason why its promotion is to be considered a matter of duty and interest. We should be glad certainly, to see the people read well, and write well, and cypher well; but these are not the concerns which excite our enthusiasm. We desire to see the scale of intelligence raised throughout the nation,—to put into the mind of every man the knowledge, and to impress it with the motives, which a training for eternity requires,—to make his animal life subservient to the great purposes of his being,—the exercise of his thoughts and his affections.

Bishop Berkeley asks whether it be impossible to conceive a nation, every man of which should be clad in broad cloth, be lodged in a comfortable house, and enjoy every day an abundance of wholesome and palatable food? And I ask whether

there might not exist a community, every man of which should, in his youth, receive instruction in science and literature, and should occupy the chief part of his time in after life, in the culture of his heart and understanding? In putting this query, I have fully in mind the limited time which remains to the lower orders, after providing for their necessary sustenance; but what they have is enough (if properly employed) to advance them the first step of the ascent towards the consummation so much to be desired—and each step will place them on a higher level by degrees, and enable them to reach a height which at first seemed unattainable. And let it be observed, that nothing is to be thought impossible, merely because it is remote from the present tenor of things, or because there is at present no visible means of its accomplishment. The discovery of a new principle, the invention of a new instrument, frequently causes the bounds of impossibility to recede, and opens a new tract to the ingenuity of man which was before unknown and appeared inaccessible. The telescope, the microscope, the barometer, offer familiar instances of this. Fifty years ago the most long-sighted would have called it impossible to ride through the air or travel five-and-twenty miles an hour. Impossibilities exist, no doubt, but they are neither so plentiful as they used to be thought, nor so easily detected. Omitting, however, for the present the consideration of what may or may not be possible by-and-by, let us endeavour to shew what is within our power as things now are. I do not pretend to give a detailed system of education,—I am not capable of it; but I shall venture, in general terms, to suggest a few of the particulars which such a system should comprise.

Let it be assumed that every child may have been taught to read and write by the time it is eight years old—that it may remain at a day-school for three or four years longer—may attend an evening school for as long a time, and a Sunday school for an indefinite period afterwards. Speaking of the bulk of the people there seems to be nothing impossible in all this, though there certainly would be individuals whose opportunities would be more limited. The mechanical process of reading and writing having been mastered, the first step should be to teach the boys the value of their new acquisitions—to shew them experi-

mentally how much profit and how much pleasure might be derived from them—to make them *take pleasure* in reading, and be also pleased with the knowledge which they acquired by it. If books calculated to answer these ends could not readily be found at first, the demand would certainly create them; but there are many such already, as for example—The Parent's Assistant, Robinson Crusoe, The Evenings at Home, Bertha's Visit, and some of the writings of Mrs Hofland, Mrs Opie, Mrs Wakefield, Miss Hack, and Miss Edgeworth. Great care should be taken not to let the tasks become irksome to the scholars. We should avoid the absurdity of giving long lessons by way of retribution for offences, which is very common, and very similar to the expedient hit upon at Cambridge for encouraging a devotional taste amongst the under-graduates—for certain offences they order you to attend chapel a given number of times by way of punishment! Arithmetic would require labour, perhaps disagreeable labour, but the lessons need not be long continued, and its obvious utility would reconcile the boys to the degree of labour necessary for its attainment. As in reading for amusement, the boy would insensibly acquire the habit of reading with facility, so in writing for practice he might impress a great many facts or dates upon his memory, by writing down such facts half a dozen times, and the exercises in arithmetic might, in like manner, contain and be conversant about some useful truth, instead of mere figures with no meaning attached to them.

The transition from the day-school to the evening-school is supposed to take place about eleven or twelve years old. The evening-school to be held for two hours every evening, Saturdays and Sundays excepted. With a proper master, and all fit "appliances and means," the variety and extent of knowledge attainable within three or four years would be great indeed, compared with the quantity hitherto thought sufficient; a facility at all the common operations of arithmetic, an introduction to its higher branches, and a competent knowledge of geometry, would call for and repay the closest application on the part of the scholars; and at this time of life, close and laborious attention should be required, as being a habit of inestimable value to the mind, but should not be continued after the fatigue has be-

come painful. Perhaps three lessons a-week of an hour each would be sufficient, and there would remain seven hours a-week applicable to other purposes, of which about half should be given to physical science, and half to general literature. Some small treatises, containing about 100 pages each, have lately been published by the Society for Promoting Christian Knowledge, on several branches of physical science—geography, astronomy, and botany,—and they will probably publish similar treatises upon chemistry, geology, and anatomy, or if they do not, unquestionably somebody else will. Employing four hours a-week, a boy might be expected to get up one of the little treatises pretty well, and so obtain an acquaintance with the elements of one of these sciences in three months, and in this manner twelve several branches of inquiry might be gathered in three years. The remaining three hours a-week might be devoted to general literature, and particularly to a knowledge of the state of our own country, considered historically, civilly, and commercially, and to a comparison between it and other countries. There would be time for nothing more than the *elements* of each science; but I would purposely make the range wide, in order that the boy might make his own selection of the one or two subjects which he would choose to study more deeply. One would attach himself to Chemistry, and another to Botany, and whichever he might fix upon he should have assistance and encouragement to pursue. He would have already mastered the first principles, —he would have a mind accustomed to the patient consideration of things presented to it,—and he should have access to the books necessary to his ulterior progress. He would thus be furnished with an inexhaustible spring of mental happiness, and a preservative from the vices which beset the hours of relaxation of uncultivated minds; he would have the chance of making his knowledge useful to himself in the community, and the certainty of seeing at each step proofs of the wisdom and goodness of his Creator!

The next part of the process to be adverted to is the Sunday school. Attendance at the Sunday school should commence very early, so that by the age of fourteen or fifteen the boy should have become tolerably well acquainted with the Bible, —with the time and place of the several events recorded in it,—

the cotemporary history of other nations,—the manners and customs of the Jews,—and the most remarkable prophecies, and their fulfilment,—so that all the facts of the Bible history might be fully and clearly before the mind, to be afterwards reflected and reasoned on at leisure. But about the age of fourteen or fifteen should commence the principal course of instruction,—than which, indeed, the imagination can conceive nothing more important. It should have for its objects to unfold to the pupil's mind the end and aim of his creation, and of that of all the objects which surround him, and to enable and accustom him to contemplate the relations which he stands in to his fellow-creatures and his Creator. If ever the mind of man is to shake off the earthy particles which clog its wings,—if ever it is to make successful war against its fleshly lusts,—it must in its young slender state be bathed in the living waters of religion. Mere human learning and human motives will not do. It is like bathing in Abana and Pharpar. The affections will fall on earthly things, if they be not carefully fixed on such as are heavenly. A course of instruction extending over the Sundays of three or four years after fourteen years old, affords us the means of instilling such principles, and imparting such knowledge, as shall enter, as it were, into the substance of the soul, and change its nature. It may be made to see God in all his works, and thus to be surrounded continually by his presence. The pupil is to be made acquainted with the several kingdoms of the material world, the laws impressed upon them, and the purposes for which they were created. He should be made to perceive the benevolence of those purposes, and the unerring wisdom with which they are brought about by the means employed. The laws which govern the motions of the planets, are very fertile in examples of benevolent intentions, effected by Infinite Power and Wisdom. Laplace says it is infinity to unity against their being regulated by chance. Upon this earth, perhaps, nothing bears more striking testimony to the attributes of its Maker, than the human frame. Mr Abernethy used to say in his lectures, "Dr Young was right, an undevout astronomer *is* mad. *But what shall we say to an undevout anatomist?*" The truths of geology, chemistry, and several other sciences, raise equal admiration, and lead to similar conclusions. I need not enume-

rate the several departments into which our acquired knowledge has been divided. It is sufficient in an elementary treatise like this to say, that in subordination to the interests of religion, I should propose to devote the Sunday school hours to the acquisition of a comprehensive knowledge of the state of the material universe,—to an acquaintance with the philosophy of the mind, and of the history of mankind in times past. It has been presumed, that the length of the time of attendance on the Sunday would be indefinite. It might be for six months only, —or it might be for twenty years, and whether it were more or less, it shall be applied in the same way. But taking a medium of two hours a-week for three years, I would devote half the time (one hour each Sunday) to physical science and natural theology, and the other half to ethics, including the evidences, doctrines and duties of Christianity; and the two hours should be passed, not so much in learning lessons, as in passing an examination before the master of the lessons set on the preceding week. With the elementary knowledge of the sciences supposed to be acquired at the evening school, the pupil would make rapid progress with further instruction in the same sciences; and having had his mind so long exercised in acquiring knowledge, he would be made prepared to examine the evidences of Christianity. The works of Dr Paley would afford an outline of the principal matters proposed to be taught. His Natural Theology, though a perfect model of the manner in which theology should be taught, would impart but a very slight knowledge of natural history. Perhaps the Bridgewater treatises may be found suitable to the purpose; but, if not, other books of no greater bulk may be found or written that will do so; and it should be a maxim, not to be departed from, that each subject should be thoroughly understood before another should be undertaken. In pointing out the marks and design in the mechanism of the eye, I would detain a boy there till he understood it, even though I never advanced another step with him. In so short a time as three years, it would be folly to think he could become *thoroughly* master of many sciences. This would be impossible, and is unnecessary. The most prominent and striking facts of each might be seized and brought out, and indelibly impressed on the mind; and if at seventeen or eigh-

teen years of age, the boy left school, after such a course as is sketched above, he would carry with him a mass of knowledge, valuable in an economic and domestic point of view, but of far greater value from the religious odour which would be exhaled from it. His faculties would be expanded—his apprehension sharpened—his curiosity excited—he would be blessed with a taste for literature, and with a heart inclined to devotion; and there is, undoubtedly, some hidden connection between devotion and taste. The contemplation of the magnificent works of God will certainly address to the understanding irresistible evidence of his existence and his attributes; but it will do more;—whether we are able to explain it or not, we know what a soothing effect it has on a fevered mind to go forth on a calm summer evening, or on a star-light night, and merely gaze upon the lovely scene around or above us, letting the soiled mind bleach itself, as it were, in their still and holy light,—after musing calmly on the innumerable multitudes, and vast distances of the heavenly bodies, or on the mighty revolutions which the earth's surface has undergone, at periods many times more remote than the creation of man, the mind is filled with awe, with wonder, and divine astonishment. We feel, as it were, in the presence of God; we become for the time more calm, benevolent, and devout; and this is perhaps the highest and best feeling to which any effort of our intellect can raise us. Let me pause here for a moment to ask, why that pitying smile which curls the lip of my not ungentle reader? He respects, perhaps, the benevolence which wishes for all these things for the common people, but he pities the understanding which thinks them possible! Let him diligently search his own mind, and examine well his own reasons for thinking they are impossible. If he find no better reason for the faith that is *not* in him, that such things cannot be, because they are impossible, or because they never have been, he will, if he is wise, enjoy his incredulity in silence; but if, on the contrary, he finds serious ground for thinking that the nature of things is against my proposals, and will take the trouble of stating them in print, I will either confess myself convinced by his arguments, or give him my reasons for retaining my own opinion.

Apart from their *practicability*, every body must concur in

the *desirableness* of carrying these views into effect. The duty and expediency of promoting a knowledge of the Bible is an axiom to be assumed, and not a point to be proved. In the Bible there is no doubt much that is plain and obvious,—the moral precepts are so for the most part: "Thou shalt do no murder," "Thou shalt not steal;" but in the doctrinal and the historical part, there is much that requires elucidation,—much to excite and much to reward inquiry. Perhaps it may be objected that there is as much contained within the four corners of the Bible, as it is necessary for a man to know, and perhaps it may be enough for him who has no means of knowing more; but is it superfluous to understand the Evidences of Christianity? and can all the facts which go to prove the genuineness and authenticity of the Scriptures be learnt from themselves alone? Manifestly not. Or take the example of the Prophecies, professedly given to prove the inspiration of those who uttered them; the prophecies relating to Christianity alone are spread over the whole surface of the Old Testament, and I know by experience that it requires considerable labour, implying leisure for bestowing it, so to class and arrange them for one's-self, as to adduce a clear prophetic narrative from the whole, and to perceive its force. The prophecies which relate to the Jews are very numerous, and to perceive their application requires a knowledge of the history of the Jews from the death of Jacob till now. In like manner the prophecies relating to Egypt, Babylon, Tyre, &c., are made useless and of no avail, if we are not acquainted with their fulfilments, which cannot be fully proved without the aid of profane history. If these things were written for our instruction, ought we not to read and understand them? By the rules of our Church, a man is forbidden to take orders till he has proved himself competent to teach these things. But why should he teach, unless it be desirable for his hearers to learn, and if they ought to learn, then "quocunque modo rem." Their being instructed is the object, and equally useful, whether effected by oral or written instruction. There are many facts and circumstances which, when once submitted to the mind, may carry demonstration with them, but which not one man in a thousand would discover for himself. Let any man read Paley's Horæ Paulinæ before he denies the truth of this. There are many facts asserted in

the Bible account of the creation which could be known to Moses only by revelation, but which may now be proved by modern science; for instance the descent of mankind from a single pair, and the order of time in which the several classes of animals were created. Surely these are among the most interesting portions of our knowledge, and should be known as widely as we have the means of diffusing them. The united ingenuity of the whole world might be employed for thousands of years in making these and similar discoveries, but having been once made, they may be taught in the nursery. "Ex oribus parvulorum," &c.

I have now given the outline of an enlarged system of popular education. Besides its direct effects, it must necessarily engender in the mind a habit of reading and reflecting. District libraries being universally established, this habit of reading might supply whatever the previous education had omitted, and would secure a constant progression in the path of improvement. But it is of the very essence of such a scheme that it should be tried upon a large scale. If a few boys only were selected from a town, and educated in the most careful way imaginable, they would still labour under a great disadvantage, from being surrounded by the uneducated,—the good precepts of the master would produce their proper effect, *minus* that produced from the bad example of ignorant parents and companions. They would find no community of thought or feeling among their associates, and would be very apt to sink down to their lower level. Nor would it be till the second or third generation that the results would be fully evolved. It would not be till the children had not only a pious and well-informed schoolmaster, but parents possessing similar qualities. But if the influence of example is great in alluring towards vice, it is also great on the side of virtue; and if the bulk of mankind were educated as we propose, and if their tone of morals were thereby elevated, even those who did not, or would not, directly receive education, would be indirectly improved by it, through the discouragement which their vicious practices would sustain from the reprobation of their neighbours; and thus, the influence of example, and the force of opinion, which would in the beginning be adverse to the mo-

ral improvement of the world, would in the end be conducive towards its promotion.

It would be vain to think of pourtraying the state of society to which this perfect development of our intellectual and moral faculties would lead. The physical condition of the people would be so much improved that we should more than half achieve the millennium. When the intellects of a whole nation shall be turned towards the enlargement of knowledge, the result, as compared with what has been effected by a few insulated individuals, will probably be as their relative numbers. What power will they not acquire over inanimate nature! An example (probably a weak and inadequate one) of the extent to which human toil may be so lessened is afforded by the steam-engine, but much greater things than this seem well "within the bounds of possible achievement." Can any body demonstrate the impossibility of discovering a cheap and easy method of separating the two gases which form water; and if such a discovery were made, the world would have light and heat for nothing! The effect of a few such discoveries would so far abridge the labour of man that one-half of his time might be taken from toil and given to other pursuits. The increased intelligence of the lower orders would enable them to secure their share of these advantages, and to insist that the labour performed by them as a body should be diminished as fast as inanimate machines could be devised to labour in their places. This would lead to more leisure, and still further mental improvement, which would produce a farther melioration of their condition, and so on indefinitely. The most grievous diseases which afflict the body may probably yield to some specific remedy, which the growing knowledge of physical nature and the multiplied number of observers could so greatly increase our chance of discovering. Cancer and consumption may probably yield to human sagacity, as the smallpox and the goitre have done before them. With the decrease of want and suffering, would decrease also the temptation to relieve them by dishonesty. On the elevation of the moral taste, the vices of drunkenness and low profligacy would become less frequent and less contagious. And men, being thus comparatively free from the cares of poverty, the distraction of pain, and the allurements of vice, would

occupy themselves in those pursuits for which their education had given them a taste.

It will be well if the discoveries of science be not too far in advance of the improvement in morals, of which there appears to be considerable danger. A single discovery of a chemist or a mechanician might so far supersede the necessity for labour, but the mass of the people should have a great deal of leisure before *we* have taught them *how to use it.* If they should be freed from the necessity for toil before they are endowed with the restraints of virtue and with the taste for knowledge, they will be exposed to the inroads of all the bad passions and propensities of human nature. Wild beasts and reptiles occupy the earth till man appears to claim it, that there may be no void in creation, — and the human kind is occupied by the cares and concerns of this life, until it is fit for the reception of its nobler tenants,—the love of knowledge, benevolence, and adoration.

I am perfectly aware of the imprudence of thus unreservedly setting forth the vast extent to which I think education should and may be carried. I know the various and not very complimentary reflections to which it will give rise,—indifference, contempt, ridicule, or hostility. Many will mock, but I trust some will reflect again on this matter. The creature on whose education it is proposed to bestow so much care is not a beast of burthen. The lowest among us has eternity before him, thus to fix his own place in it by his conduct in this life. The question, therefore, is, How best to qualify him for this great enterprize, and not how to make him more useful or less troublesome to his master or his parish?—and I do charge that hitherto the latter question has been studied more carefully than the former. Hitherto we have not treated our poorer brethren, like the sons of one father with ourselves, but, "like our asses and our dogs and mules," have used them "in abject and in slavish sort."

There are three or four societies which have the power of beginning such a system, and on which rests consequently the responsibility of neglecting it. The Society for Promoting Christian Knowledge, The National, and the British and Foreign School Societies, and perhaps the Highland Society of Scotland, if the object lies within its sphere. Through their great influence

and extensive connexion, they could cause the adoption of any system which they approved of,—and having these important things presented to their minds, they are guilty of misapplying their ten thousand talents, if they neglect them through indolence or indifference. The already existing Infant Schools, Day Schools, Evening Schools, and Sunday Schools, have prepared for them the requisite machinery. To agree on and make public a proper system, to see that it had a fair trial, to cause the necessary books to be written, and to provide instruction for such masters as might want it, would be the business of the parent society. And it is not this kingdom alone which would benefit by such measures, it is the whole world,—our power and influence are beyond comparison greater and more widely felt than those of any other nation. Providence appears to have entrusted us with the charge of carrying light and civilization round the world. It is a most honourable and most responsible station, which we cannot desert without infamy. Let us reflect well on the position in which we stand. If manfully and diligently we execute the commission given us by our Great Commander, we shall find our reward in his approval. If we sleep upon our post we shall certainly be relieved and punished.

ACCOUNT OF THE METHOD OF PLANTING OAKS AT LEVENS, IN WESTMORELAND.

Few trees are of more importance in our island than the oak. It is one of the finest ornaments of our landscape; and it is from it our navy draws its chief supply of materials. So valuable is this tree, that many plans have been adopted in planting and rearing it. Of all these, there is perhaps scarcely any preferable to that followed by the ingenious Mr Forbes, gardener at Levens in Westmoreland. Levens is the beautiful seat of the Honourable Colonel Howard. The gardens are remarkable as a specimen of the ancient style of English gardening. They were laid out by Beaumont in the reign of James II., and are, by the present proprietor, preserved in the same style.

Mr Forbes, an attentive observer of nature, having found

much injury produced by the usual method of planting the oak, by thrusting forcibly into a hole the tap-root, has obviated it, by adopting another. He makes a cut in the root upwards, a little below the place where the root issues from the stem. This slit enables the root to be laid or bent down on the ground when planted, in a horizontal position, in the hole made for the purpose. The root, placed in this manner, is then carefully covered over with earth.

In planting oaks in the common way, by pushing the tap-root downwards, much injury must necessarily be done to the growth of the young plant. All plants having tap-roots draw their nourishment into them by small fibrous roots. These, acting like as many mouths, suck in the nutritive matters from all quarters, and ultimately throw them into the main root. The main root then conveys the nourishment into the stem and leaves, there to be converted into different substances, sap, bark, and wood. The common manner of planting oaks, by thrusting the tap-root downwards, injures these small fibrous roots. In the operation of this common way of planting, they are pushed upwards, and consequently are diverted from their proper direction, horizontally or vertically. Being so much injured and wounded, they ultimately either die or languish, or dwindle on in a feeble state for a while; or those that survive the violence they have suffered, retard for a long time the growth of the plantation. No growth of the young plant can be expected until these injured fibres are replaced by new ones. The tap-root also being injured by this forcible thrusting into a hole, often has its point broken, or bruised, or "rusted," as it is called. The wounds it has received must consequently retard its thriving for some time. Accordingly, where such a method of planting is followed, numbers of young oaks remain stunted, if they do not altogether die. But Mr Forbes's plan of managing the root of the sapling oak, in the way described, seems to prevent all these injuries of the old method. He begins planting the oak as early as the middle of November, and continues putting them into the ground until the end of February. And from the moment the spring commences, the young oak, placed under such favourable circumstances, is prepared, with all its fibres uninjured in the planting, to thrive immediately, and to grow vigorously. For

more than twenty years Mr Forbes has adopted this plan. The rapid growth and healthy state of the oak woods at Levens demonstrate most forcibly the advantages of this method of planting over every other. While, on the contrary, a neighbouring proprietor's oak woods, growing on the same kind of rock, but planted on the old plan, and at the same time with those of Levens, have annually required more or less renewing with fresh plants; but those of Levens have scarcely required a single oak plant to be replaced. M.

FOREST SPORTS OF CANADA.

THE publications which have issued from the press on the subject of Emigration to the Canadas are numerous. Many of them, besides the mass of solid and important information which they convey, possess a considerable degree of interest from the style in which they are written, the dry details of agricultural and statistic subjects being enlivened by judicious narrative and agreeable adventure. Among the most recent publications on our American colonies, is to be ranked the Letters of Mr Magrath and his friends from Upper Canada.*

The editor is already known to the public as the author of "A Report on the Agriculture of Eastern and Western Flanders;" and with a *predisposition* to be instructed and pleased by his recent publication, and expecting something out of the *beaten track*, we have taken it up in quest of information relative to a tract in the London district, of which we have hitherto heard but little. Nor has our expectation of deriving pleasure and profit from these letters, edited as they unquestionably are with good taste and judgment, been disappointed.

Mr Radcliff's family (as a natural effect of the circumstances

* Authentic Letters from Upper Canada, with an account of Canadian Field Sports. By T. W. Magrath, Esq. The etchings by Samuel Lover, Esq. Edited by the Rev. Thomas Radcliff, Dublin. Wm. Curry jun. & Co., Dublin: Simpkin & Marshall, London: Oliver & Boyd, Edinburgh. 1833.

detailed in their letters) will soon find themselves surrounded by a class of settlers of their own rank and resources, or at least far superior to the ordinary description of adventuring colonists. We are not in the number of those who would lighten a surplus population by thinning out the lowest classes only, or the mere outcasts of society, pennyless and wretched adventurers whom parish funds or provident landlords send to Quebec without the means of advancing to those western points where labour is most required, and most certain of gaining steady remuneration.

If the principle of emigration be admitted, if our colonies are to be peopled from the mother country, it seems rational to desire that the nucleus of a respectable population should be formed, and this can best be effected through the instrumentality of the élite of the parent stock, attended and assisted as such settlers will be by "hewers of wood," whose habits and conduct will be improved and regulated by the higher moral standard of those in whose wake they follow. It is absurd to say that emigration may not be rendered a material source of advantage both to those who leave the mother country and to those who remain behind. We know what the state of the agricultural department is with us, how difficult for the farmer to maintain his labourers in any thing like comfort without ruin to himself, and how impossible, under existing circumstances, to realize an independence. If we required any additional assurance on this point, we have it in a book just published by *authority*, "On the Administration and Operation of the Poor Laws." It appears from the testimony of some of the most intelligent persons in England, that the quantity of available and unproductive labour in that country is immense, that (as an illustration) the agricultural riots and burnings in Kent in 1830 and 1831, were occasioned by want of labour. There had been a failure in the hop gardens, in consequence of which very many labourers were unemployed, and the thrashing machines in consequence became the first objects of attack, while many of the farmers were in a state of insolvency. The returns made, all tend to prove the degraded state of the labouring poor of England, and their degradation appears to result in a great degree from the system of gratuitous support which they receive at a

rate as ruinous to the occupier of land as it is destructive to energy in those who are the recipients of it.

What, then, is to become of the British farmer whose capital is gradually diminishing, and of the labourer who wants employment? Where the latter has emigrated to Canada at the expense of his parish, that parish has been relieved *pro tanto*, and the emigrant has prospered. Of forty-six persons who were induced to emigrate in 1830 from the parish of Stradbroke in Suffolk, the accounts were favourable; one only returned, and he was an abandoned character who could not have succeeded any where, and unhappily (the English poor-laws giving a place on the pauper roll to the idle and the dissolute equally with the infirm and the industrious), this *mauvais sujet* continued chargeable on his parish.

What is to become of all the younger branches of our gentry now-a-days? Where can offices and employments be found for them and their rising families? The church, the bar, the army, the navy are filled to repletion; nor is there a lack of practitioners in the medical profession. What, then, is to be done with persons of this class? Mr Radcliff, in his preface, thus expresses his feelings generally on the subject of emigration.

"Emigration has commenced upon a great scale, and will continue. Publications in its favour, or against it, will not avail.—Truth and facts will be sought for, as the only guides. Let the prudent and credible settler signify that he prospers, and state with accuracy the means of his success, he will be followed by those who, from various causes, feel that *they are unsuccessful*, and therefore anxious to place themselves as soon as possible in a state of independence. An enterprise of such 'pith and moment' must, in most cases, be undertaken through much tribulation. Deep and heartfelt will be the sigh of regret —bitter the tear of affection at leaving home, and relations and friends, perhaps for ever!—But should that home have become irksome, unprofitable, and insecure—and should many near and dear friends be induced to swell the group that emigrate, or mean to follow in their steps—the gloom would disappear—the change of country be forgotten, or reconciled by the active occupations of the new settlement, and the anticipation of its eventual prosperity.

"As this applies to settlers of a higher grade, well connected and well educated, it may be asked—Is there not, to persons thus circumstanced, something repulsive in the idea of encountering the wild forest, and the society, if any, of persons whose customs, habits, manners, and education, so widely differ from all that *they* were taught to admire and approve?—The answer is—the wilder the forest, the more exempt from such society, unless persons of that description become fellow settlers—which unpleasant alternative is now obviated by a late and judicious arrangement of the government to accommodate special groups of emigrants with their friends and followers, by sales of land in the same township; thus putting it within their power to exclude strangers, with whom it might not be agreeable to associate."

Thirteen members of Mr Radcliff's family, including children and servants, departed for Upper Canada in the spring of last year, 1832, and appear highly gratified at the step they have taken. The information afforded by a family of such recent emigration, however judiciously communicated, would form but scanty matter for even the small octavo which lies before us. The editor, however, has had the further advantage of various letters from a gentleman of the name of Magrath, who has been six years actively employed in Upper Canada, and whose family reside near the capital of that province, the father of this gentleman being the clergyman of the township of Toronto. The letters of this gentleman, and his critical observations and remarks on agricultural matters and forest sports, are among the most instructive and amusing.

Nor are the advantages of graphic illustrations representing scenes alluded to in this interesting volume wanting to render the whole complete. The inimitable pencil of Lover, whose wit as an author is only rivalled by his talent as an artist, has given additional life and effect to some of Mr Magrath's vivid descriptions. In the breakfast scene, the bear takes her seat with a mildness and placidity which would reflect credit on a maiden enjoying a *tête-à-tête* with her lover, while the humour depicted on Mr Magrath's countenance is truly admirable. Nor can we overlook the sprightly scene of the racoon hunt.

After the usual details of expense, outfit, provisions necessary

for families of the higher grades of settlers, Mr Magrath goes into the consideration of the question, Whether it would be more advisable for the emigrant to enter the bush, or to occupy a farm partially cleared. In order to this comparison, he supposes the case of two farms of 200 acres each, at the distance of thirty miles from York, and calculates every item of expenditure, and states every inconvenience which a new settler has to encounter.

The letters of Mrs William Radcliff are written with all that feeling and spirit which so generally render female correspondence more agreeable than that of the other sex. Both the light and serious style of this lady's composition evince in her the possession of an accomplished mind. And it would be unpardonable in us to overlook the sweet Hibernian morsels of Bridget Lacy, which is the only fictitious *name* introduced into the volume; but all the circumstances which are related in her name are quite correct.

By-the-way we are informed that there is a good opening for medical gentlemen and nurse-tenders. "Physicians are very much wanting here, and apothecaries still more. Ignorant persons act in that capacity, who scarcely know the names of the drugs they sell. At Niagara that most necessary branch is solely conducted by a female, who compounds medicines and puddings with equal confidence, but not with equal skill. Any young man who should come out in that capacity, with even a moderate knowledge of his business, would make a fortune. Nurse-tenders are in great demand. They might make their own terms."

Mr W. Radcliff purchased 400 acres in the township of Adelaide, within twenty miles of Lake Huron, where his lady and her sister-in-law are the first female *whitefeet* that ever trod the soil; this he obtained for L. 200. His brother, and other Irish gentlemen of the names of Weld, Phillips, and Groome, are in his immediate vicinity, where the land is admirable, and we are told that it will become threefold its present price in two or three years.

There is some very important information afforded by Mr W. Radcliff on the subject of money investments. He placed his own spare cash in the bank of York, where it brings 12 per cent, and is perfectly safe. Government are the holders of one-

third of the entire; and in order that many may partake of the advantage, no individual is allowed to invest more that L. 1000. His deposit was in gold, and he received 4s. exchange on each sovereign. 300,000 sovereigns have been deposited in the bank of Upper Canada within a year.

Among the wants of this province, is chiefly to be ranked the paucity of clergymen—a serious evil. There is an entire chapter on the state of religion from Mr Thomas Radcliff, which complains of the lamentably insufficient number of Church of England ministers. The inducements held out to clergymen of the Established Church, are, cash income L. 100 per annum, glebe 200 acres partly cleared, one half in perpetuity.

There is a letter from Mr W. Magrath, entirely descriptive of the Missisagua Indians in their settlement (in the parish of the Rev. James Magrath), with whom the writer and his family appear to be on habits of intimacy. Their three chiefs being Lawyer, Crane, and Jones, are well pourtrayed, and another chief, John Brant (lately deceased), has been hospitably received at the Government House, and danced quadrilles "much better than some of Garbois' pupils." He was altogether a man of most gentlemanly manners; and the ladies have no objection to "trip on the light fantastic toe" with a thorough bred Indian chief.

Mr Magrath's description of his fishing tour to Lake Huron is eloquent and interesting.

"On a hunting excursion through the woods for some weeks, with two Indians, who carried my baggage, and a few others who joined me; happening to have 'The last of the Mohicans' in my pack, I read extracts to my party at night, around the fire, and the astonishment they expressed at a white man being able to describe their native scenes and characters so precisely, was a greater compliment to the talented author than any I can pay him; for the Indian seldom forgoes his self-possession, or evinces feelings of pleasure or pain by words or gesture. On this occasion they were highly pleased, and expressed themselves so. One night, when encamped on the shore of Lake Huron, our *literary* party was interrupted by the sound of many paddles, and we soon discovered that some new arrival had taken place. On going out, I perceived eleven canoes discharging their crews opposite our encampment. In less than twenty mi-

nutes there were fires blazing in all directions, and the cooking going on as if they had been there as many weeks. Shortly after, two chiefs came forward, shook hands with me in the free and friendly manner an Indian generally does, and, at my request, supped with me. They had come to that part of the lake to take white fish, which is the best fish; and, there, most abundant.

"Next morning I had a noble dish sent me as a present by the chief, Wagna; and on his signifying that they would take to the fishing-ground at noon, I purchased one of their bark canoes and paddles, for five dollars, and joined the *Fleet.*

"Will you believe it? I never passed a more agreeable time in my life, than when surrounded by this party, at times 150 in number; nearly 100 miles from any settlement, and I myself the only white man (not *very white* either) in the entire camp. My tent was pitched on a green bank, about twenty yards from the wigwams, with its door to the lake, into which I plunged every morning from my bed, and either joined my companions during the day, in hauling the net; or, taking my rifle to a deer pass, never failed of sport, as some obliging Indians were always ready to surround a portion of the Bush, and drive the game in the direction where I stood. This was generally at the entrance of the valley, and with two or three good marksmen below me, we seldom returned *lightly* laden. I always beat the Indians at a running shot, at which they are not expert; but whatever might be our individual success, all we shot went into the general stock; and whether I went out or not, my table, or rather my mat, was regularly furnished with fish, duck, or venison, in profusion. With what pleasure I look forward to another such excursion! At night the shore was brilliant with the fishing lights in the canoes, and I had to walk but twenty paces into mine, to enjoy as fine sport as the most enthusiastic fisherman could desire.

"After a residence of six weeks with my red brothers, I prepared to return homeward, and felt much regret at parting from them, so marked was their kindness to me, and so good-natured their attention. When I fixed the day, every one had something to give, and had I accepted half what they presented, two canoes would have been insufficient to carry away the provisions.

I embarked at five in the morning; when three miles distant from shore, the sudden swelling of the lake, and black appearance of the sky foreboding storm, I directed the men at the paddles to turn back, and before we had got within a mile of shore, the waves (as is often the case in those lakes) running mountain high, we made every possible exertion, but very little way. The wind was right ahead, the canoe small, and freighted with six persons,—but she rode it like a duck; we at length reached the land, nearly exhausted, and I was welcomed back with as much cordiality as if my absence had been for weeks instead of hours. Had we not returned we must have been inevitably lost; in a short time, however, I was safely lodged again in my old quarters."

The day did not close until it had witnessed this melancholy incident:—

"About dusk, a canoe, with two Squaws on board, was observed struggling to make to the shore. On inquiry, I found they belonged to our camp, had been about a mile along the coast for some fish which had been left behind, and were blown out as they were rounding a headland close to us. We could observe them throwing out the fish, and the group on shore had hopes of their arriving in safety; none, however, attempted to go to their assistance, knowing that, in such a gale, both canoes would be endangered, as, by a sudden collision, they would be upset or staved to pieces; they, nevertheless, looked on with deep anxiety, when, as the little vessel rose on the summit of a wave, the foremost paddle snapt close to the hand of the Squaw that plied it, and disappeared. She lay down in the canoe, and her comrade could do no more than prevent it from turning. In a moment a canoe was launched by two men, one of them the husband of her who still worked that which was in distress; they [illegible] making some progress to her relief, when it became so dark [illegible] sight of both. The shouts of the two men to discover where the canoe lay, were feebly answered by the unhappy women, and then all was still.

"I had a fire lighted on the beach, as a beacon to direct them [illegible] the excessive darkness of the night. The group around it [illegible] one finest subject for a painter that can be imagined. [illegible] stood about eighty in number, gazing at the flame,

blown by the wind in all directions, the light thrown strongly but fitfully, on the features and figures of the Indians, but not a word was spoken,—at length the grating sound of paddles reached our ears; the light of the immense fire flashed on the approaching canoe and the persons it contained,—the two enterprizing men, accompanied by *one female!*—Poor Segenauck—the wife of an attached husband, who hoped and tried to save her—was no more! They landed—not a question was asked—all retired to their wigwams in solemn silence. In a few minutes I was alone.

"The manly and dignified manner in which this melancholy occurrence was received,—the solemn, but silent, tribute of regret paid by all to the memory of one of their tribe, thus suddenly called away, gave me a still more favourable impression of my Indian companions, and sent me to bed, with the storm in my ears, and its fatal result occupying my waking and sleeping thoughts till morning. I learned, then, from Segenauck's husband, that as soon as the canoes came near each other, the Squaw at the head, taking hold of the gunwale of that in which he was, cautiously stept in, forgetting, in the hurry and danger of the moment, to keep hold of that she had left, which, losing the weight in front, rose at once out of the water, was blown round and upset, without a possibility, on his part, of saving his unfortunate helpmate.

"The storm ceased in the night; the morning was very fine. I left the camp at break of day, and was soon out of sight of my kind and hospitable companions. I quitted them with a degree of regret, in which I have since found I was not singular. In Moore's Life of Lord Edward Fitzgerald, we find that unfortunate nobleman expressing himself to the same effect; and I have heard many say, that those who were long in the habit of Indian society, were generally fascinated by it,—as the excursion which I have described to you, has left on my mind a similar impression. Should I not, in the course of a year or two, be able to prevail on some fair friend to share with me the world's cares and pleasures, I shall resume the blanket coat, the mocassin, the rifle, the snow shoe, and only visit the haunts of the *deceitful* white man, when my red brother gets tired of me."

But the most interesting portion to us of this little volume, are the graphic descriptions which are given of what are called the *field* sports, in the title-page, but which may more appropriately be termed the *forest* sports of Upper Canada, the open fields, where they do exist, presenting little temptation to the sportsman. The forest sports comprehend deer, bear, partridge, woodcock, snipe and duck shooting, and racoon hunting. The sports with the lister and the net in the rivers and lakes, with the salmon, trout, mullet, and herring, may, in Canada, be classed among the sports of the forest.

There are four modes of shooting deer. That which is termed *snow-shooting*, is best accomplished in a peculiar dress. "The dress," says Mr Magrath, "should consist of a blanket coat, made to button up to the collar; a cap of the same material; a warm pair of light-coloured trowsers, *three or four* pair of stockings under the moccasins, or a piece of blanket rolled round the foot, as a protection from stumps,—thus, with a leathern belt to carry your hunting knife, and with a rifle, you are accoutred for the hunting-ground." There can be no good sport without a good rifle; Mr Magrath's experience has enabled him to recommend one of the following description. "It should be two feet ten inches in the b rrel, about ten pounds weight, and of a bore suited to balls of forty in the pound; a description of rifle shot, experience has taught me to prefer to any other. This, however, is a point on which you will seldom find two sportsmen agree, as your fellows of light metal generally prefer a bauble. I have invented a powder flask," he adds "to contain caps, balls, and powder, to save the necessity of fumbling with cold fingers in different pockets, for the several articles." Thus accoutred, let's to the forest, but "hark forward," for the art of sport requires tact.

[illegible] arriving at the scene of action, you find the wood [illegible] fresh tracks, stand steady for a time, and observe [illegible] deer are in motion. If you spy one that does not see *you*, continue to be concealed by the trees, whilst you approach him—should your step be heard, stand still, and never stir till he begins to move: when within shot, fix your eye on a space through which he must pass; your finger, rifle,

and eye, all ready. If you require it, take a rest against a tree, but be sure to cover the spot, and as he passes, aim for the shoulder, and fire. Should you miss the deer, don't stand gaping like a fool, but load again at once, as he may be simple enough to give you a second shot, and you may have the luck to hit. Should he go off with his *single* (tail) DOWN, he is wounded. Keep as close as you can, and if he do not fall from the effects of the first shot, you can make sure of him by a second; your hunting knife must then be employed in the necessary operations—and, lastly, in opening the muscle of the nose and sinews of the fore legs, so as to admit a gad of the blue beech to pass through, and connect them all together—then taking the rifle on your left shoulder, and the gad over your right, you may pull away to the next house—but should you object to this laborious work, and yet wish to secure the venison, till an opportunity offer of sending for it; the head must be first got rid of, and the skin, to preserve it entire, be stripped from the *fore*, and left attached to the *hind*-quarters, when, the carcass being cut across, you must look out for a tree of small diameter that will bend with your weight upon climbing up—as soon as it begins to spring, let go your feet, holding on with your hands only, and you will thus bring the top to the ground. The half deer fastened to this (as the tree springs back) is put out of the reach of wolves and bears, as the former *cannot*, and the latter *will not*, climb a tree of such pliable dimensions. A stem calculated to raise but half a deer, could not fail to give way under an entire bear, besides, that to admit of being climbed, the tree should be of sufficient circumference to fill his embrace, and Bruin is too shrewd a fellow to take the risk of a failure, and a fall. The remaining half must be treated in a similar manner on a separate tree. When you cross a river or ravine, never expose your person suddenly, and instead of walking along its edge, make a circuit through the wood, coming out with caution about three hundred yards below your point of entrance; and observe to examine the brow of the opposite hill, as the deer, in winter, always lie in a situation that commands a wide compass. If two sportsmen are in company—one should show himself at a distance to attract the attention of the deer, whilst the other, making a circuit, may come round un-

noticed, and have a fair and decisive shot. This has happened to me in many instances. Should the snow be very deep, snow-shoes become necessary. I have had occasion for them, however, but one winter out of six—at first they are very unpleasant, experience only will teach to use them without inconvenience."

"The second variety of the sport is termed *deer stalking*. This takes place in summer—at which time the deer are so much scattered over the face of the country, it becomes very difficult to find them. This is best to be effected at the *salt licks*, or springs, whither they resort to drink. The sportsman should walk quietly along, in the direction of one of these—stopping occasionally to listen, and reconnoitre. By observing this precaution, and strict silence, I have frequently known the deer to walk up within ten yards of me. In this mode of hunting, the arms should remain perfectly at rest; the body erect and steady—all motion limited to the legs and feet—no sawing of the air—no coughing—no brandishing the handkerchief—no sounding of the nasal trumpet—no flourishing the rifle from one side to the other—and above all, no *talking*—else the deer will be off. They have eyes, and ears, and a quick sensation of alarm. They dart away at a distance, and you will never get a shot."

"A third method is termed *night shooting*. The proper season for this sport is during the months of July and August. The time from midnight to day-break. In this case the salt spring is again the scene of action. Besides your rifle ready loaded, you bring thither, as appurtenances, a lantern with a concealed light, a bundle of pitch pine split into small stripes, and a *flask of brandy;* on your arrival seat yourself to leeward of the spring, that the deer, which are quick scented, may not perceive you on their approach. Let not a gleam of light escape, and remain quiet, till you hear a deer leap into the little marsh, which always surrounds the spring, then, waiting a few moments, slowly produce the light, and taking the rifle in your right hand, and the faggot in the left, apply your light, and ignite it gradually, as a sudden flash would put the deer to flight. As the faggot of pine wood, formed like a Bavarian broom, spreads an increasing light, you begin to perceive the

game, the eyes first; which, from the reflection of the blaze, appear like balls of fire; you then take deliberate aim, and if you are not a *bungler*, you will bring down your deer. Still move not farther than to reload. They generally come in pairs; if not so now, drag out the fellow you have shot, resume your former situation, and you may probably bring home a second deer; avoid the does; the bucks are now very fat and in high season."

"The fourth method is that of *driving the deer*. This is, in my estimation, an unsportsmanlike method, and is effected in the vicinity of lakes, by driving the deer with dogs, who pursue the animal through the woods, till he is obliged to take refuge in the water. There, a canoe is in waiting; and as the hunted deer comes bounding along, and boldly dashes into the lake, the aquatic hunters follow slowly, till he has made some way, and then press on the chace. Thus pursued, the deer makes for the next headland, at a rate of swimming which seems to baffle his pursuers; but they contrive to intercept his landing, and he turns again to the expanse of water. The sportsmen, (if they deserve that title), not a little exhausted, still gain upon the wearied animal, he gives up his former course, wheels again and again in narrower circles than the canoe can compass; yet makes no way—his nostrils distended—his head less raised above the water—his swimming slackened—he sees the canoe approach him—snorts wildly, but cannot escape the fatal noose thrown over his gallant head by his enemy in the boat, who twisting it on his neck, by means of the long pole to which it is affixed, thus puts an ignominious termination to the poor deer's life, and to the inglorious chace. Sometimes I have been gratified by seeing a novice take the deer by the horns. That moment he strikes at him with his fore-feet, and unless the boat be a large one, invariably upsets it, or pulls the *Green-horn* overboard. The common practice is, when the deer is perfectly exhausted, to seize him by the tail with one hand, and make use of the tomahawk with the other—a description of butchery to which I never have, nor ever will be, accessary."

Now for a touch at the bears:—

"The bear, though apparently an unwieldy animal, gets over the ground faster than one could suppose. I have had a

pet one for years (reared from a cub), that follows me about, and has often kept up with my horse when at a round canter. This huge black bear, standing five feet high when upright, is of the *fair* sex. The name to which she answers, 'Mocaunse*.' Her qualities, mildness and docility. She runs about the house like a dog, and is invited to the drawing-room when any visitor arrives, who wishes to make her acquaintance. When my avocations led me to the woods in distant parts of the province, Mocaunse was the companion of my journey, and the nightly guardian of my tent—not a sound or stir could be made, without a warning from her cautionary whine, or growl. It was amusing to observe with what gravity she took her seat each morning at the opposite side of the mat, upon which my breakfast was arranged, and the *patience* with which she waited for her share of the repast. In this cardinal virtue she failed but in one instance. One morning on the shore of Lake-Huron, my party having stopped to prepare breakfast; whilst my servant was getting ready mine, I plunged into the lake to indulge in a bracing swim, and on returning with 'increase of appetite,' found Miss Mocaunse, lying down perfectly at her ease, having devoured every morsel of my breakfast—biscuit, bread, sugar, all eaten up, and the tea *equipage*, &c. in the most glorious confusion! Conceiving it necessary to impress strongly on her recollection my disapprobation of such unladylike conduct, and to guard against the recurrence of a similar disaster, I tied her to a post, and bestowed upon her hairy sides so sound a drubbing, that, benefiting by this practical lecture upon patience, Mocaunse has invariably waited breakfast for me ever since. Bears are not as numerous as they were on our first coming to Canada—nor are they as troublesome, or as dangerous, as is supposed. They have been sometimes known to carry off a small pig; but as to their attacking the human species, without being grievously provoked, (though it *may* have occurred), no instance of it has come within my knowledge or experience. They seem rather to avoid a conflict with man, but if assailed and injured by him, there can be no doubt that his danger would be in proportion to their strength and power,

* "Mocaunse is, in the Mississagua language, Young Bear."

which are very great. The manner of shooting bears is much the same, as in the case of deer, with the exception of using a heavier ball; and, that should you wound one badly without killing him, the sooner you get up a tree, too slight for *him* to climb, the better for your own security. The winter skin of the bear generally sells for six or seven dollars, and is very useful in sleighs, and as bedding. The meat of a *young* bear is not unlike pork, but infinitely better. I have frequently eaten it, and like it. In New York it is considered a great delicacy, light, wholesome, and easily digested. The interior fat, entitled *Bear's Grease*, is valuable for the hair, more in *demand*, than in *real existence*, in the shops. I sent over some to ladies of my acquaintance, who perceiving that it was neither bleached nor scented, preferred, as I am told, the medicated hogslard of the perfumers. One fellow that I shot, produced me as much pomatum as would cover the tonsured heads of an entire monastery, with a pile of hair as thick as a wig."

The graphic and humorous but candid confession of fear which overtook our young sportsmen the first time they encountered a bear, we cannot resist inserting. "I shall never," says Mr T. W. Magrath, "the longest day I live, forget the hour I killed him. It was one of my earliest essays in this branch of sporting. A few weeks after we arrived at Toronto, my brother and I, in walking through the woods with our rifles, observed several pieces of bark falling to the ground from an old pine of great dimensions, and on looking up, perceived an enormous bear, endeavouring to lodge himself in the hollow of a tree; after some consideration, it was agreed that *I* should be the assailant, my brother reserving his fire, lest mine should prove ineffectual. With this counter security against the *fraternal embrace* of a savage animal, dangerous when attacked, and furious when wounded, I took the most deliberate aim, and fired; at the moment came rolling to the ground "with hideous yell," the shaggy monster, writhing in agony. We looked from him to each other—our resolve was rapid, as mutual—we ran for our lives; whichever occasionally took the lead, fancied the footsteps of the other those of the pursuing bear; to our ear, he seemed to close upon us. The rustling of the underwood increasing our alarm, doubled our speed; and it is diffi-

cult to say when we should have stopped, had we not found ourselves up to the knees in a deepening swamp. From hence we cast an anxious look behind, and not espying Bruin, plucked up our courage, and with my rifle reloaded, and both cocked, began to retrace our steps, with due and exemplary caution; about midway a black squirrel darted across, our imaginations were so deeply occupied with terror of the bear, our rifles were in a second at our shoulders, and I will not say, whether a little more would not have given us a second race. We proceeded, however, *gallantly* towards the place where my first shot had taken effect, and making our observations, at *respectful distance*, we remarked the bear at the foot of the same old pine; when my brother, saying that he looked *suspicious*, fired with a certain aim; he need not have been so particular, as poor bruin never winced, and had never moved from the moment that his terrifying, but expiring, roar had put us to ignominious flight. Many a weary tug it cost us to bring him to our house; where the candid confession of our exploit excited no inconsiderable fun and merriment."

The Backwoodsman tells us like a man of sense, that "when a bear runs away with one of your pigs, there is no use in going after him, hallooing, without a gun. You may scar him away from the mutilated carcass, but it will make but indifferent pork; since not being bred in Leadenhall or Whitechapel, he has but a slovenly way of slaughtering. But trace to where he has dragged it, and near sunset, let self and friend hide themselves within an easy distance, and he will be certain to come to his supper; which, like all sensible animals, he prefers to every other meal. Nay, it is highly probable, if he possesses the gallantry which a well bred bear ought to have, he will bring Mrs Bruin and all the children along with him, and you can transact business with the whole family at once." "Whenever they have killed a pig, if you do not manage to kill the bear, you will never keep one hog; for they will come back till they have taken the last of them; they will even invade the sacred precincts of the hog-stye. An Irishman in the Newcastle district once caught a bear, *flagrante delicto*, dragging a hog over the walls of the pen. Pat, instead of assailing the bear, thought only of securing his property; so he jumped into the pig-stye

and seized the pig by the tail. Bruin having hold of the ears, they had a dead pull for possession, till the whillelooing of Pat, joined to the plaintive notes of his *protegé*, brought a neighbour to his assistance, who decided the combat in Pat's favour, by knocking the assailant on the head *."

The racoons (the *Ursus lotor* of Linnæus), which, collecting in numbers, destroy the grain crops, are hunted by a species of sport which does not admit of much variety. "In the moonlight nights the racoons collect in numbers in the cultivated fields, to regale upon the Indian corn, and are there to be attacked with caution, as they retire with the slightest noise, which makes it particularly necessary to keep all quiet about the house and farm-yard for an hour or two after nightfall; at which time, having a dog well trained for the purpose, you sally forth. The dog may be 'half lurcher and half cur,' or of any description that has a tolerable nose and *an audible voice.* The moment he comes upon the scent, he gives tongue, and the racoons immediately fly to the adjoining trees. He runs the first, to the tree in which one has taken shelter, and remains barking at its root. You come up, and from the indication of the dog, as well as from the assistance of the moon, you have no difficulty in finding your game, or in killing it. When you have shot the first, lay the dog on again; the same result may be expected; and so in continuation, till, by the cessation of the barking, you are apprized that no other racoons remain. Occasionally, however, a more animated scene takes place, by day-light, when one of those animals may happen to exhibit himself in a tree beside the house. This is the only hunting of wild animals, in which the fair sex partake; but on this occasion the entire family turn out: men, women, children, domestics, dogs, &c. If there be a gun in question the sport is soon over; if not, the tree must be cut down. Pending the operation, all eyes are fixed on cooney, sitting aloft with perfect composure, and looking down with ineffable contempt upon the gaping enemy; and with some justice!—for how could he imagine, that, with the purpose of destroying a peaceable and harmless animal like himself, a do-

* Statistical Sketches of Upper Canada. By a Backwoodsman. Pp. 39 and 41.

mestic host should be arrayed against him. He gives no credit to it, till the creaking tree yielding to the axe, begins to give way, when running rapidly down the stem, and bolting up that of an adjoining tree, he makes a second effort at security. In the confusion upon his first descent, he frequently escapes; all striking at him together, intercept each other's implements of war. Cunning and nimble as a fox, he avoids them all; but should he cling to the falling tree, he comes to the ground, bruised, and stunned, an easy victim to the beetle, potstick, fleshfork, or poker of the amazonian cook-maid, who carries him off in triumph to the kitchen, encouraged, by her success, to hope for a few more to line her Sunday cloak with their comfortable skins."

Partridge-shooting is no great sport in Canada. A whole covey of these stupid creatures will perch themselves on the branches of the trees till they are picked off one by one. "The coveys," says Mr Magrath, "when raised, generally perch in trees and sit there, as tamely as barn-door fowl. The best dog to use in this case is of the genuine King Charles breed—who, when he finds, will quest, and *tree* the birds, whose whole attention being fixed on him, as he barks at the bottom of the trees, you may come within half distance if you wish, and pick them off one by one, without disturbing the rest; unless that, by firing at the upper birds first, their tumbling through the branches will disconcert the others and make them take wing;—even in this case, the lively cocker will follow and tree them again; and unless in the vicinity of a settlement, where they are frequently disturbed, you may shoot three or four brace from the covey without any difficulty. The dog must be trained not to mind the fallen birds but to pursue those on wing, and thus, from tree to tree, you may by degrees bag the entire covey, without compunction, as, in this country, no one ever thinks of leaving any for breed. Your poaching sportsmen, whose main object is a supply for the table, and whose epicurean tact appreciates the delicious flavour of the bird, think this delightful sport; but I cannot agree with them—there is something inglorious in a sitting shot, that a true professor cannot brook."

On the contrary, in regard to the woodcock, a sportsman of

this country will prick up his ears at this recital:—" It appears extraordinary to a sportsman, coming from the old country, who has been accustomed to shoot woodcocks, in the depth of winter, to find, on his arrival here, that the summer months are those when that sport is enjoyed in high perfection, not at the moment reflecting, that they, being birds of passage, will be led by instinct to desert the northern latitudes (before they become bound in impenetrable frost), for milder climes whose unfrozen springs are better suited to their manner of subsistence. Ireland is, in many places, remarkable for excellent cock-shooting, which I have myself experienced in the most favourable situations, not, however, to be compared with this country, where the numbers are truly wonderful. Were I to mention what I have seen in this respect, or heard from others, it might bring my graver statements into disrepute. As a specimen of the sport, I will merely give a fact or two of not unusual success, bearing, however, no proportion to the quantity of game. I have known Mr Charles Heward of York to have shot, in one day, thirty brace at Chippewa, close to the Falls of Niagara; and I myself, who am far from being a first-rate shot, have frequently brought home from twelve to fourteen brace, my brothers performing their parts with equal success. After dinner, now and then, an amicable disputation will arise as to the number of shots hit and missed, which is generally decided by reference to the remaining contents of the powder-horns, all having been equally filled in the morning."

" The woodcock here is smaller than those I was in the habit of seeing at home. When flushed they rise with a kind of whistle. In settlements near a river they are most numerous; but never appear until some clearing has been made. I have never met a woodcock in the *wild bush* in all my excursions. The snipes are pretty much the same as with you, differing a little in plumage, and being less wild, are more easily shot. There is a variety called the *great snipe*, not very common. The former kind is to be met with every where, and are in such numbers, that a tolerable shot may bring home from twenty to thirty brace in a day."

Duck-shooting is most exciting sport. The sharp eye and quick ear of the duck keep the sportsman ever on his guard.

Prone at times to indulge in the most clamorous vociferations, ducks cannot endure to hear the chatter of a sportsman, or his "brushing with hasty steps the dews away." Every visit to them must be paid in the quietest way possible. "Ducks," says Mr Magrath, "particularly abound in a marsh near York, where the amusement is enjoyed thus:—You get into a canoe or skiff, with a person expert at the use of the paddle, and then proceed quietly along, avoiding the dry sedge and rushes as much as possible. The sound caused by their brushing against the sides of the canoe, disturbs the ducks from their feed, and sets them on the watch, in which case it is very difficult to get a shot. The true method is to proceed with two canoes, that while one remains quiet, the other, making a wide circuit, may come round the flock, and make them fly over the party, in that which is stationary. This method can seldom fail of success. Great steadiness, however, must be observed on board, in default of which, many accidents take place. I have known a whole party lose their guns by the awkwardness of one who, unaccustomed to "*the skimmer of the seas*," lost his balance and upset her, treating himself and his companions to a hazardous swim and wet jackets. In lake-shooting, a friend of mine, in letting down the hammer of his gun, discharged its contents through the bottom of the canoe, at a considerable distance from shore, when the only mode of safety was to hurry off his coat, place it over the orifice, and sit down upon it firmly; at every swerve of the canoe, a plash of water would break in, making his situation as uncomfortable as dangerous, till at length he reached the shore, immersed above the hips. For river-shooting, the Nottawesaga, which runs into Lake Huron, is the best duck river I have ever met. Twenty pair a-day has been with me a common day's sport. They abound here from the remoteness of the situation, and from their being seldom disturbed. Here are to be found, in great numbers, the large black duck, the *Canard Francois*. You come at them in this way: when you perceive a flock on the water, you must paddle *slowly* towards them, keeping in the middle of the river; if you go faster than they can swim, they will take wing, but if you proceed quietly, they will continue to swim before you, joined, perhaps, by another flock, but not within shot. When you have

driven them thus for a few hundred yards, run the canoe into the sedge at the river's side, remaining silent and concealed; presently they will all return down the river to their feeding-ground. Wait till they are just passing; determine how many are to fire at them on the water, and how many in the air, and a great havoc is the certain result. Chasing the wounded birds is esteemed good sport. For some days my party ate of nothing but ducks. Too fastidious to be at the trouble of plucking the feathers from the entire body, they merely bared the breast, and cutting it out threw away all the rest, except when the Indians, who were with me, wished to convert the refuse into soup; and even then they were not very particular as to the *feathers.*"

The lakes and rivers in Canada actually teem with fish, so much so, that perhaps a delicate fly-fisher has little advantage over an inveterate whipper of the water. Incessant poaching, however, will in time thin the "finny race" in even the mediterraneans of Canada. "Whoever is fond of fishing," says Mr Magrath, "should bring with him his tackle duly prepared, a stiff trout rod, and all the usual requisites for angling. The flies made use of here are precisely the same as those which are most approved with you."

"The Canadian trout is neither squeamish nor particular, and will not disdainfully reject *any* that you may throw in his way, but on the contrary will rise briskly at *some* that *your* epicures of the stream would hold in utter contempt.

"I have frequently caught from nine to ten dozen in a few hours, where an artificial fly had never appeared before. In fishing for trout, the *bass* frequently takes off the fly. The salmon fly is best suited to them, which is here but seldom used, as the salmon are so well fed at the bottom of the rivers, they are, in but few instances, known to take the fly; and the most usual method of killing them is with the *spear.* If this take place in the daytime, a bright sun is preferred, and a tree having been felled, so as to fall across the river, the sportsman taking his stand on this, rests quiet, and strikes the fish as they pass up. Any violent movement will alarm the salmon, and drive them suddenly back or make them shoot forward with great rapidity. By observing stillness and composure, I have

known a good spearman to kill from forty to fifty salmon in a few hours.

" The method, however, which is usually preferred is *night-fishing*, which is effected thus: Two sportsmen take their stations in a light skiff, one at the bow, with spear in hand, the other at the stern. The spear is three-pronged, the handle twelve feet in length, of the best white ash; the thickness, that which is *well known*, but *better handled*, in every fair in Ireland, under the title of a *shillelagh*.

" In the bow also is secured a pole of stronger dimensions about four feet in length, to the top of which is appended, by means of a socket, an iron jack, or grate, moveable on pivots, so as to balance, and right itself, when the boat moves roughly through the rapids, and to prevent the fire or light wood which it is to contain from being thrown out. This jack or grate is circular, about one foot in depth, and fourteen inches in diameter. It is supplied from time to time with pitch pine, cut into lengths of eight inches, about inch and half in thickness—a large heap of these is piled in the centre of the skiff, from which magazine the light-jack is replenished, so as to keep up a bright and continued flame, which blazing upwards from two to three feet, exhibits clearly to your view the fish even to the depth of ten feet, or fairly *across* the river where it happens to run shallow. The spearman takes his stand behind the jack. If in *deep* water, he at the stern plies the paddle, if in *shallow*, a light spear; by means of which he prevents the skiff from bolting too suddenly down the rapids, and often strikes a fish the bowman may have missed. Thus appointed, you go as quietly as possible down the stream, and on seeing a fish, you must not be in too great a hurry to strike, unless in a shallow and rapid part of the river. If in deep water, the blazing jack throws down its light upon a salmon, let your eye not swerve from the object, nor your spear deviate from its poise, till you strike; and when you do, observe that you throw yourself back to preserve your balance; or an upset, and a cool dip, will be the penalty of your incaution.

" In aiming at the fish, strike nearer to you than he appears, and nearer still, in proportion to the depth of the water. In this respect, the young sportsman will meet frequent dis-

appointment, as nothing but experience will enable him to calculate the power of refraction, so as to reconcile the real and apparent distance.

"You should always aim at the shoulder, and if you strike successfully, bring in the fish with as much expedition as possible, lest he should twist himself off the spear; when you have him fairly in the skiff, you loose your spear from the fish, by striking it against the seat. Should the salmon, however, at which you have struck, escape, and turn down the stream, keep steadily on, and when he wheels to pass you, wheel also rapidly, by putting out your spear at one side to assist the steersman, then push up the stream to get above the fish, as he will generally rest some time after making what is termed *the dart pass*, and you will be sure to find him in the first sudden deepening of the river. The slightest wound he may have received will appear quite white in the water, and should he be out of distance, you must endeavour to strike, by *throwing* your spear, for which purpose you must grasp it at the middle with your left hand, and at the top with your right, and fling it at the remote object with such aim and dexterity as you can command. Many are expert at this, but he that is not, had better avoid the experiment, as the effort will probably be unsuccessful, and it will require the greatest possible steadiness to keep his feet, when the spear has quitted his hand. Shortly after our arrival here, my brother and I speared 120 salmon of a night; but they are now becoming less numerous, in consequence of the number of saw-mills erected, the profusion of saw-dust on the waters (always annoying to the fish), and the multitudes of oak staves annually floated down the river.

"By the hardy sportsman, night-fishing is always preferred, but is a source of misery to the *Dandy*, who is afraid of wetting his feet. For this description of animal I have so little respect or pity, that I have often undergone a wetting by upsetting the canoe, to enjoy the terror of the *would-be* sportsman. One need not, however, often volunteer these occasional ablutions; they will occur of themselves, and when you least expect them."

With a curious fact in the natural history of the salmon, we shall conclude these interesting accounts of the sports of Canada. "The salmon-fishing is to me the most agreeable,"

says Mr Magrath. "I have taken in the river Credit, in spring, within twenty yards of our hall-door, as fine fish as I ever met in Ireland, as firm and full of curd as if within ten miles of the sea, instead of *five hundred*. It is still a matter of doubt with some, whether the salmon of Lake Ontario visit the ocean every year or not. My opinion is, that according to the natural history of that fish, they must do so. It is only in the waters that communicate with the sea they are to be found. No salmon was ever seen in any river or lake *above* the Falls of Niagara; indeed it would be, as the Yankee expresses it, "*pretty considerable of a jump for him.*"

We can recommend these "authentic letters" as being full of interest and amusement; and though we could point out a few inaccuracies, they detract not from the general excellence of this little work.

ON THE PRESERVATION OF POTATOES.

(To the Editor of the Quarterly Journal of Agriculture.)

At page 381, vol. iv. of the Quarterly Journal of Agriculture, in the Number for June 1833, there occurs the following observation:—"There is only one objection to the use of the potato as a prepared food for horses, namely, the impossibility of keeping them for use during the summer." This objection may probably be obviated by the adoption of the following method of preserving potatoes *, mentioned by the Rev. Mr Cartwright, in the Communications to the Board of Agriculture, vol. v. p. 234; or it may suggest some other mode of equal result.

"Three and a half pounds of potatoes were peeled and

* As its comparative *economy* would be the only inducement for farmers to relinquish the present mode of feeding their work-horses, for that of preparing the food for them, it is obvious that any plan which would impose much labour in the preservation of potatoes would remove the only motive for substituting them for hay. The great desideratum, in economy and utility combined, is the discovery of a mode of preserving potatoes in their *natural* state during the summer.—EDITOR.

rasped, and put into a coarse cloth, between two boards in a press, and pressed into a dry cake, like a thin cheese, which was placed on a shelf to dry. A quart of juice was expressed, to which was added a quart of cold water, and in about an hour it deposited 60 grains of very white starch, or flour, fit to make pastry. This cake was kept nearly three years perfectly sweet. The potatoes lost about a third of their weight by the process, but upon being dressed, either by steam or otherwise, will produce nearly the same weight and quantity of food the potatoes would do. Potatoes, after washing and peeling, and cleaning from discoloured specks, might be pounded and ground, and pressed into these cakes, or cheeses, for the use of the navy, or against scarcity, and might supply this important food in all seasons. Machinery of the nature of the washing-machine and cider-press might greatly facilitate this mode of preservation. A piece of the cake that had been made three years ago was boiled, and turned out perfectly sweet and pleasant to the taste. It is necessary the potatoes should be perfectly ripe to keep well. If some quick and expeditious and cheap method could be introduced of thus preparing and preserving large quantities of this article of food, and a market opened for its sale in this form and state of preservation, it might prove a great resource in future scarcities, and is well worth encouraging by premiums. The experiment is well worthy of being pursued further."

In the 31st volume of the Transactions of the Society of Arts, Mr Whately, of Cork, describes a machine, "by which one individual can rasp or grind 15 cwt., 1700 lb. nett, into soft pulp in one day. By calculation, the power of a single horse will be equal to the grinding of twenty-two tons of potatoes per week."

By one or other of the preceding methods, or by Bramah's press for compressing cotton, hay, &c. or by similar contrivances and apparatus, it is very probable that potatoes could be cheaply and expeditiously formed into dry cakes, *on a large scale*. Mr Cartwright says, that the potatoes lost about a third of their weight, but a quart of juice expressed from raw potatoes, would weigh *more than two pounds*, for a quart of distilled water weighs two pounds. The pulp of the above quantity, therefore, even when newly compressed, must have weighed *less tha*

one pound and a half, and this, by natural or artificial drying, might subsequently have been still further reduced. The ultimate result, probably, when prepared and fully dried, would be one-third of the original weight of the potatoes, in the form of compressed pulp, containing fibre, and such portion of the starch, gum, and mucilage, as was not carried off by the expressed juice; and the remaining two-thirds would consist of water having some portion of starch suspended in it, as is seen in Mr Cartwright's process, and some gum and mucilage in solution. This result is rendered highly probable by the following analysis by Sir Humphry Davy, of the black kidney potato, from which that of the best other kinds in use would not probably be very different. In the avoirdupois pound of 7000 grains, Sir Humphrey Davy found of gum, mucilage, &c. 970 grains, of pure starch 695 grains, of fibre 622 grains, and of water 4713 *. It is thus found that upwards of two-thirds of the potato consist of water. It is evident that the reduction of the potatoes to one-third of their original weight, while almost the whole of the nutritious portion is retained, would render the article very manageable and marketable, to a very considerable distance. As the pulp may be compressed into masses or blocks of such shapes and sizes as may be most convenient for packing, it is probable that without, but at all events with, a frame, a single horse-cart could conveniently contain 15 cwt. of the compressed pulp, when dried. This would be equal to 45 cwt. of raw potatoes. For feeding horses, cattle, pigs, poultry, sheep, &c. no other nicety would be required, before reducing to a pulp, than washing the potatoes well from earth, and removing those that might be damaged or unsound; but, for domestic purposes, it would probably be necessary, in addition, to pare and carefully to pick out all specks or spots, and perhaps also cut them open to ascertain that they were sound within.

G.

* See, for the above analysis, Sinclair's Hortus Woburnensis, London, 1824 p. 409.

ON THE CHARACTERISTICS OF CATTLE. *By Mr WILLIAM AITON, Hamilton.*

THE important art of agriculture is not limited to the tilling of the ground, or the raising of grain and useful roots, but extends to the rearing, feeding, and improving the domesticated animals, so as to render them, and their produce, subservient to man. The melioration of the soil improves the quality, and increases the quantity of corn roots and useful herbage; while these, in their turn, increase the number, and improve the condition of live-stock; and all these serve to increase the food, and add to the comforts of man. Husbandry, therefore, opens a wide field for the exercise of human ingenuity. But it is only to one branch of that extensive science that I can now advert, namely, the aptitude of cattle to accommodate themselves to local circumstances. I shall endeavour, in the sequel, to describe the breed of cattle best suited to the dairy, and the most approved dairy management in Scotland.

As Mr James Wilson has already stated, in a valuable communication in the eighth number of this Journal*, all that can be necessary for the agriculturist to know respecting the origin and natural history of the domesticated ox, and its allied species, I will not, of course, enter on that subject.

The pliability of animals of the *Bos* tribe is a matter of great importance in the husbandry of Scotland, embracing as it does various particulars, some of them more obscure, and less attended to, than any other branch of rural industry. When we consider how many different species of animals have been domesticated, their internal structure, dispositions, and external aspect being thereby changed, and the numerous breeds or varieties into which they have been already formed, and the great aptitude of the animal economy, by which still greater changes might yet be made in them towards improvement in the important uses which domestic animals have been made to serve; it becomes a matter of great importance, in a national point of view, to trace out the means by which they have been improved, in order to direct us to means of their still further improvement. For though we doubt, as well we may, that the *Aurochs* of Lithuania, which

* Vol. ii. p. 176.

are four times the size of our kyloes; the *Bison*, with its shaggy mane, like a lion, a long beard like a goat, and a hump upon its back like a camel; the *buffalo*, the *zebu*,—were all of the same species with the ox in Britain, and capable of generating with them, as some have imagined, still there are not only many varieties or breeds in Britain, but such changes have been effected by human industry on some of them, as to establish, beyond doubt, the great mutability of animals, and to satisfy the most sceptical, that by due attention to breeding, feeding, and treatment, incalculable improvements may still be made upon every variety of our domesticated cattle. No human power, it it true, can transform any animal into a different and permanent species; but changes almost incredible have been effected in various breeds of cattle, by the skill and industry of man. For instance, the dairy breed of Ayrshire, has been altered during the memory of many people yet in life, into a variety as different from what that breed was sixty years ago, as one breed of cattle in Scotland is from another; and this change has been effected without much introduction of the blood of other strange breeds. Every change therefore which has been made on that breed is equally practicable on every other breed of cattle in the kingdom.

If man has been able to overawe or destroy ferocious animals, and can not only tame, but improve those which are fit for his purpose; if he has, in about half a century, changed a starved, ill-shaped, and unproductive race of cattle, into a breed of double their former size, and rendered them more beautiful, and capable of yielding four times the quantity of milk which they formerly did; and if all these improvements have been made, without a great admixture with any other breed,—it shows, that the diversity in the size, shapes, qualities, and produce of cattle, arises chiefly from feeding and treatment, though much no[illegible] may be also achieved by judicious crossing. No man [illegible]erefore say, that the improvement even of the dairy stock, or that of any other, is yet so complete, that it cannot be farther meliorated. What has already been done, gives us the assur[illegible]ce that not only inferior breeds are capable of being improved, but that cattle have not in any case attained that degree of perfection of which they are susceptible.

It is evident that all the cattle of the family *Bovium* in Great Britain and Ireland, and over the greatest part of Europe, have sprung from one common origin; and that the diversities we see in their size, shapes, qualities, or produce, have arisen from some corresponding difference in climate, soil, feeding or treatment. So long as animals retain their natural liberty, they preserve the same uniform appearance. They are all clean-made, have glossy hair, spirit and dignity are depicted in their countenances, and they have courage to defend, sagacity to elude, or swiftness of foot to escape, from their enemies. But whenever animals are deprived of this liberty, and become dependent on man for food and protection, they soon lose their natural sagacity and power of defence. If amply supplied with food, they will indulge in eating to satiety, till they acquire such an increase of size as to render them sluggish and inactive. Those of them which fare worse, continue small-sized, and acquire imperfect shapes and qualities. The changes thus described, proceeding as they have generally done from diversity in soil and climate, without being much influenced till lately by skilful breeding, tend to prove the mutability of our domesticated cattle. Cattle do not perambulate the country so much as horses, but are generally reared and fed for several generations in the same district, often on the same farm, and of course they remain at the size which the pasture on which they are confined is calculated to support. Their shapes and qualities are thus governed chiefly by the richness or meagreness of their food, though also in part by the mode of breeding. Hence we find large, strong cattle in some districts, and a small puny stock in others. Hence breeds have been formed and fixed long before improvement was effected in the soil, or any attention paid to breeding. Hence different districts of the country has different breeds, according to the capability of the soil to support them. Hence these different breeds are not different species of oxen, but only varieties. Hence the large breeds in Fife, Angus, and Aberdeen, are of the same species with the smallest ones on the Grampian Hills, or those in the least fertile of the Western Islands. They are all not only capable of generating with each other, but the smallest might easily in a few generations be raised by better feeding to the size of the largest; and, by judicious cross-

ing, their shapes and qualities might at same time be raised to the highest standard of perfection.

The shapes and qualities of cattle vary much, not only in different breeds, but in individuals of the same breed. The taste of particular breeders regulates these properties, while others more properly study the uses to which cattle are destined, and regulate their shapes and qualities accordingly. These conflicting circumstances may account for the variety of shapes in the different breeds of cattle, but they render the determination of a perfect shape more difficult; for it is evident, until all breeders are agreed on this point, diversity of shape will exist as long as there is a diversity of opinion. Utility of purpose, however, should be the ruling principle in regard to shape. If one shape is better suited to the production of the dairy, and another to the development of flesh and fat, then these points should be adhered to by breeders. Experience alone can determine these points. But the diversity of shape thus arising from the principle of utility will also in its turn render the attainment of ultimate perfection the more difficult. Hence the matter is involved in difficulty. The subject, however, is of such importance as to merit the serious attention of all who rear, deal in, or write upon live-stock.

It is long since the external figure of cattle began to be attended to. The grazier preferred those which he found from experience fattened best; the dealer purchased those which looked well in the market; and breeders would naturally wish to rear the cattle that brought the highest prices. The error of many consists in attending to the external aspect only; but it is chiefly of importance as indicative of a healthy internal structure. Those who deal in cattle should not be influenced by fancy, they should acquire a knowledge of the uses of the internal structure, their due proportions to each other, how they severally contribute to the health, vigour, and fattening of animals: and they should ascertain by observation how far sound or imperfect viscera are indicated by the external shape of the animal. Having acquired a complete knowledge of these matters, breeders of stock should direct their attention to such an improvement of the external figure as would give greater scope to the lungs,—would promote the digestion of food, and circulation of the

fluids—increase the lactic secretion in dairy stock—or otherwise promote the health of the animal for the uses to which it is appropriated.

Some have complained of the horns, as being useless appendages; and butchers frequently complain of too much offal. But before we attempt to abridge, even the parts which are of least pecuniary value in the carcass, we ought to ascertain, not their value to the flesher only, but the purposes they serve in the living animal; and we ought to consider how an encroachment on these parts would injure the health of cattle. The horns and tail may appear useless, and parts of the viscera are thrown away; but it would be as foolish to encroach on these, as it would be for a proprietor of growing trees to divest them of leaves and bark, because they yield no price, and may appear to waste the substance of the trees.

It is matter of regret, however, that we are yet in the dark on this very important branch of husbandry. It will require time, and assiduous research by people of different professions, to develope the mysteries of the animal economy. Many appropriate forms and qualities have been mentioned by authors as of superior excellence, and drawings have been exhibited to render them intelligible. But these considerations regard more the general aspect than the internal structure; which would require anatomical investigation of a superior character to that which the breeders of cattle or butchers can be expected to bestow.

On this subject, Dr Coventry, in his remarks on live-stock, says, "The descriptions given in different publications are to be received with some distrust; for though they may be sufficiently correct, in so far as they are taken from individuals high in repute, yet the present state of science does not permit us to conclude that the selection of such a standard of comparison has been at all so ample, or so unbiassed, as to afford strong conclusions in their favour, or to furnish claims for the general and indiscriminate adoption of the forms prescribed, as the chief, not to say the exclusive, models of good shapes." The constituents of excellence are yet so imperfectly ascertained, that we are hardly *in limine* of the subject. Dr Cline also remarks, that the external form of animals is only an indication of their internal structure, and that the principles of improvement must be

founded on a knowledge of the structure and uses of the interna: parts. But as this subject requires an investigation, which I am incapable of giving, I shall leave it to the consideration of physiologists. I shall merely mention some of the shapes and qualities of cattle, which are their most obvious characteristics, and which accord with the present state of our knowledge on that subject.

A large ill-shaped head, and large bones, are evidences of the want of spirit and activity in many of the domesticated animals. It will generally be found that cattle that have an undue proportion of bone, are dull and inactive, as well as unshapely. The large coarse bone is mostly round-shaped, and this shape is an invariable criterion in cattle of a dulness in feeding. An over proportion of bone, proceeds either from coupling large males with females which are much smaller, or from the young animal not being supplied with proper food, and frequently from both these causes combined. As breeders of cattle have thus a complete control over the kind of bone which their stock should possess, the existence of a large coarse round bone is indicative of the negligence of the breeder.

The figure of a well formed cow or ox should be a straight back, the body round, having the ribs standing well out from the spine, so that the viscera may have sufficient room. The neck should be rather slender than too strong, and it should taper towards the head, and bend very slightly upwards; the hams should be full and fleshy; the legs short. The head should be long and bony, and not too broad across the forehead, and of a proportionate size to the animal; the eye should be full and lively; the colour is of little importance, provided the hair be fine, thick set, long and soft. Cattle which are reared for the grazier or the butcher, are desired to be equally heavy in all the quarters; but in the dairy breed, the greatest care is taken to have the hind quarters more developed than the fore. A thick neck may be desirable in an ox that is to be put in the yoke, but in the ox it is held to be the evidence of a dull feeder, and in the cow, that she gives a small quantity of milk.

Of the internal parts of animals, the lungs are intimately connected with the organs of digestion. The good effects of a healthy circulation of the blood, depend much upon the lungs being of a proper size, and sound state. The more speedily and

completely the digestive organs convert the food into nourishment, the greater will be the aptitude of the animal to fatten, or to give milk, even on a moderate quantity of food. For it is well known, that among the domesticated animals, as well as in the human species, some individuals consume a much greater quantity of food than others, without acquiring greater size, better condition, or yielding more milk. That diversity in the effect of food, on different animals, proceeds from the viscera of some of them being sounder, and of more perfect construction, than those of others. When any part of the intestines cannot perform their functions, the food is not reduced to proper chyle, and passes through the animal without having its alimentary substance rightly absorbed. In that case, though much food may be consumed, the animal is imperfectly supported.

Though the internal organs are hidden from the eye in the living animal, their dimensions may be ascertained from the external figure of the body. If any animal is narrow in the chest, in proportion to its size, the lungs must be too much confined. If the ribs are flat, the abdominal viscera will press too much downwards. The pelvis, or cavity formed by the junction of the haunch-bones with the rump, ought to be capacious, in proportion to the size of the animal, so that the female may not suffer in parturition. The dairy breed of cattle is more capacious in the pelvis than any other of the varieties of cattle. The width of the hips, and the space between the hook-bones, point out the dimension of the pelvis. A well-formed cow of the dairy breed resembles a cone, having its base at the pelvis, and the apex towards the shoulders.

Hardiness is a desirable quality in cattle. It is generally possessed in a high degree by the Scottish breeds. Highland-bred cattle, and moor-sheep, when in sound health, set their faces to the storm, keep their backs straight, and seem to disregard the severest weather. But some of the more refined cattle, which are kept much within doors at certain seasons, yield to the storm, hang down their heads, draw their feet near to each other, and raise their back like an arch—the surest symptom of a want of hardiness, or that they are not in a thriving condition.

Early maturity is a valuable property in cattle. This depends greatly on the way in which they are fed. The cows in the dairy districts of Scotland, when meagrely fed, never had calves till they were three years, and frequently not till four years old; but since they have been better fed they always have a calf at two years old, and some of them even younger. A calf of that breed, in the parish of Avondale, was three times in condition for the bull, and actually took him, and became pregnant, before she was six months old. But this was a premature effort, for she had no calf the next year. Cows in the island of Arran, and in some Highland districts, seldom bear calves till they are four or five years old. But if they were supplied with good food, like the dairy cows, they would, no doubt, propagate earlier than they do.

Aptitude to fatten is a valuable quality in cattle. Mr Bakewell says it is accompanied with smallness of the bone; and the celebrated John Hunter says that small bones are generally indicative of corpulency. Docility of temper is another desirable quality in cattle, provided that it is not attended with a deficiency of spirit.

These are the principal properties of well formed cattle, in as far as they can be described on paper. But still there is an undescribable something in the general appearance of cattle, and in the relative proportion of their component parts, which every intelligent judge knows well and attends to in estimating the character and value of cattle. That peculiar knowledge cannot be communicated in words. It must be acquired by long experience and minute observation, and its acquisition is not equally attained by every dealer in cattle. He only who does possess it is the skilful judge.

These preliminary points being noticed, it may be proper to inquire into the means by which any breed of cattle may be improved. These means are probably a good climate, judicious breeding, and proper feeding and treatment.

The climate has not such a beneficial effect on cattle as might be expected; for we find cattle of a larger size in the county of Aberdeen, than in the islands of Guernsey and Jersey. The cattle in Holland and Denmark are much larger than those in the south of France; and those in the Ukraine are equal in size

to any in Europe. Still, however, climate must have an indirect effect on these domesticated animals, as it influences the quality of the herbage on which the cattle are fed. Good feeding and good treatment in winter can no doubt counteract in a degree the rigidity of a severe climate; and as the quality of the herbage is dependent on a favourable climate in summer, its influence must affect the condition of cattle indirectly. Land that is by nature in a sheltered situation, or made so by plantations, is worth a higher rent to the grazier, than the same land in an exposed situation would be. Where a dairy stock is kept, shelter becomes necessary.

The mode of improving cattle by skilful breeding, has only been much attended to in Scotland within the last fifty or sixty years; and it has not yet received the attention throughout the country which its importance requires. Formerly, very little regard was paid by farmers to the breeding of their cattle. To have their cows in calf once a-year, and to rear calves on the least quantity of milk, was considered the perfection of breeding. The nature of the bull employed was a matter of no importance. The chief care was to increase the size of their cattle, by means of large bulls, without attending to other circumstances. But as these large bulls were put to cows of much inferior size, and neither the calves nor the grown cattle were well fed, the result of the union was the production of a race of large-boned and ill-shaped animals, generally inferior to both parents. Until the cattle were fed with improved food in proportion to their size, the large bulls, instead of improving the breed, would render their offspring from the puny cows ill shaped and tender. This I can attest was the result of the first attempts at improving the dairy breed of Ayrshire.

The male parent among quadrupeds has greater influence than the mother on the size and shape, as well as on the character of the progeny. A strong example of this is seen in the mule, which has little resemblance to the mare, but is very like the ass in shape and temper. As this result occurs more or less in every sort of farm-stock, care should be taken to avoid coupling large males with females of inferior size, or which are in reduced condition. Dr Cline, Dr Coventry, and others, have

shown, that breeding animals from males that were much larger than the females, has been productive of much injury to farm-stock. The reason of this precaution appears to me obvious. The competency of the mother to supply sufficient wholesome nourishment to her offspring, must be in proportion to her size, good habits, and soundness of constitution; and therefore puny ill-conditioned females, supplying nourishment deficient in quantity, and inferior in quality, must rear inferior stock.

Dr Cline, in a communication to the Board of Agriculture, vol. iv. page 440, says, "Experience has proved, that crossing has only succeeded, in an eminent degree, in those instances in which the females were larger, than in the usual proportion of females to males; and that it has generally failed, when the males were proportionally large." He adds, that the fœtus is generally in proportion to the male parent; and when the mother is small, and in poor condition, her nourishment is deficient, and the offspring have the disproportion of starvelings. I would earnestly impress this subject on breeders, from a conviction that the doctrine of Dr Cline is sound and correct, though, from the practice of most breeders of stock, it is apparently not generally known.

The most proper size for cattle has long been a matter of uncertainty, as well with graziers as with those who have written on live-stock, and the question yet remains undetermined. Indeed, few things connected with agriculture seem more difficult of ascertainment. There is such diversity of soil, of climate, in the quality of every sort of food, as well as of health, condition to fatten, in different animals, that it is very difficult to decide what should be the proper average size of live-stock. Too much anxiety is frequently shown to increase the size of cattle beyond the capability of the ground on which they are reared and fed, to maintain them to maturity. When stock has been kept for several generations on ground of the same quality, their size is governed by the powers of the soil. As this is the case, when new stock are laid on to land, it is much safer to select those which are under the size the land can support, than too large. In either case, they will arrive at the size which the land is capable of maintaining; but with this material difference in the two cases, that when stock enlarge, they are

more healthy, more productive, and more shapely, than when they diminish down to the standard of the land. All intelligent graziers are therefore careful to select the cattle which are not too large for the quality of the pasture on which they are to fatten.

An opinion has long prevailed, that when animals nearly related are coupled in breeding, their progeny becomes inferior in quality; and the longer that mode of breeding is persisted in, the stock becomes much degenerated. This system is termed breeding *in and in.* But Mr Bakewell of Dishley was the first breeder who discovered that it was quite safe to breed always from the same family, instead of using strange blood. He bred in and in, and at the same time certainly improved his stock beyond all others; and, from his successful practice, others have been induced to follow the same course. Many, however, still maintain, that breeding from animals which are not nearly related to each other, and which is termed *crossing the breed,* is the best mode of obtaining a pure-blooded healthy stock. Into this controversy I shall not enter.

I agree with Mr Bakewell, however, that the aversion to coupling animals which are nearly related, arises in some measure from prejudice; and that when any family of cattle has been brought nearly to perfection in form and qualities, it would be proper to breed from them exclusively, even though the relationship should be near. But if there were the least blemish or defect in the family so selected for breeding together (and there is none which is entirely perfect), the more frequently such families are coupled together, the greater is the danger of perpetuating that blemish or defect.

I would therefore recommend to all breeders, to select and couple together males and females, as nearly perfect in shapes and qualities as they can be procured, without much regard to whether they are related or not; but always to take care not to couple a male and female both of which have the same defect. For if the same blemish appear ever so little in both parents, it will be aggravated in their progeny, particularly if the parents are of the same blood. But if the blemishes existing in the parents are of different sorts, they will probably be somewhat corrected in their offspring.

Every rearer of cattle must have found, that some cows always drop calves, and mares produce foals, which strongly resemble themselves, whatever male may have been put to them, and that the progeny of others resembles most the male parent. It is also found that some animals of the most perfect shape produce offspring not nearly so perfect as themselves, while others of inferior points produce a very superior offspring. This freak of nature, as it may be termed, can only be discovered by experience; and, when discovered, prudence would recommend either the abandoning or the retaining of the parent, whether male or female, for the purposes of breeding. On this subject Dr Coventry says, in his pamphlet on live-stock, page 39, "The most pure and perfect race of animals may be debased by improper mixture, or injured by improper treatment. Indiscriminate matches in breeding, and inattentive management in rearing, are alike capable of producing a worthless progeny." On the other hand, a careful attention to breeding from the best animals, duly selected and matched, of proper age and condition, will insure an improvement in the breed, so great as almost to convert it into a new breed.

But though any breed may be improved by the occasional intercourse of different families of cattle, yet the crossings should never be made with two breeds which are very different in size, shape, and qualities. When cattle of very different sizes, shapes, and qualities, are coupled in breeding, in the hope of uniting the valuable properties of both, disappointment has generally ensued. Nature may be made to bend out of her usual course with domesticated animals, but she will not deviate far at a time. Ponies may be raised to a race of draught-horses; kyloes may be advanced to large oxen, or the Galloway breed may be formed into dairy stock. Such great changes, however, must not be too hastily introduced. It must be skilfully persisted in for several generations before the intended improvement can be effected; and improved treatment must correspond with the intended alteration.

Feeding and treatment are matters of such importance in the management of all sorts of cattle, that none of them can be either much improved, or prevented from degenerating, unless her correspond with the quality of the stock, and keep pace

with the melioration of the breed. When cattle which are improved in the breed are confined to a steril soil, which yields a scanty subsistence, the desired improvement in the breed will prove of little advantage. But should the improved breed be treated with better fare, they will retain their improved qualities, and transmit them unimpaired to their progeny. Breeding and feeding should go hand in hand, and the happy result arising from their union will exceed the expectations of the most sanguine breeders.

ON THE STATE OF RIPENESS IN WHICH CORN-CROPS SHOULD BE WHEN REAPED.

It is a known fact, that the uppermost grain in every ear of corn of the culmiferous crops is first ripe, whereas the undermost pod is first ripe in the leguminous crops. To ascertain when a corn crop is ripe, we have therefore only to examine the state of the uppermost grain in the ear. But on examination, we may observe the uppermost grain gone, and, besides, it is a tedious task to examine numerous ears of corn. Other marks which are more easily observed, are equally indicative of ripeness of corn. The state of the straw is a very observable mark. As the uppermost grain in the ear is ripe before any other of of the grains in the same ear, so the whole ear is ripe before the straw. Ripe straw, then, indicates ripe grain in the ear. But if the corn is not reaped till the straw is wholly ripe, the grains will be more than ripe, they will be in danger of leaving the husk, and falling on the ground. In order to save the grains, it will be necessary to reap the corn before the straw is wholly ripe. But in late seasons, the culmiferous crops die first at the root, and the straw becomes of course ripe before the ear. We thus see there is greater difficulty in ascertaining when corn is ripe than at first sight might appear. There is another difficulty of still greater magnitude connected with this subject. When corn is ripe, the grain is ready to drop out of its husk. Agitating the straw will shake it out. This agitation may arise either from the wind, or in the act of reaping. The loss of grain occasioned by the wind is sometimes very great. In 1812

the wind shook out, throughout Scotland, about 18 bushels of oats per Scotch acre. All the modes of reaping corn is attended with the danger of shaking out the grains. There are reapers with the sickle, who have a provoking habit of switching about every handful of corn which they cut, and scattering around them the grains in profusion. Such reapers are expensive servants, though they should reap without wages. Some mowers with the scythe sweep round the swath with a jerk which whips out the grains, instead of carrying it steadily round on the scythe. Many bandsters have a trick of throwing the sheaf which they have just bound up towards the stook, thereby thumping the grains out of it, to save themselves the trouble of bowing down, and carrying it afterwards to the stook. The best manner in which the reaping machines at present in existence can be managed, will not insure the safety of many of the grains. Grains of inferior quality, or those which have not become plump by bad weather, are not so easily detached from the husk or flower-stalk by the wind, or in the act of reaping, as those which have arrived at perfection. Hence the greatest shakes by wind or reaping, imply the loss of the finest, and, of course, the most valuable grain; and to a smaller extent, the loss of the uppermost grain in the ear, is at the same time the loss of the finest grain in that ear; and the loss arising from the ordinary mode of reaping ripe corn, is greater in quantity, and of course in value, than one might, without reflection, suppose.

The loss of the uppermost grain in the ear alone, and it is it which first decamps, is a loss of more than the seed of the crop. Grains of seed-corn produce more than their own number of straws, by a multiplication of stems, or by "*stooling*," as it is termed. Great care is therefore requisite in the reaping of corn. All the modes of reaping at present in use are perhaps nearly equally objectionable, in shaking out grains from the crops in the state of ripeness in which they are usually reaped. Our own experience would lead us to state that the scythe shakes out less than the sickle, as the corn is usually reaped with the latter instrument. Corn which is much laid with rain is apt to be stript of its grains with the rake of the scythe, but so is it also when reaped with the sickle, as the severed handfuls are separating from the laid corn. Bright sunshine after heavy

dews or rain renders the grain very susceptible of being shaken out with the least agitation by the wind or reaping.

The only safe way, then, to avoid the shaking effects of the elements, or the act of reaping, is to reap the crops before they are quite ripe. Grain allowed to be too much ripened assumes a dull dusky hue in sample. On the other hand, grain not ripened enough shrivels in drying. In both states it wants that brightness of colour which constitutes the characteristic of beauty in grain; and in both states it does not yield the quantity of farina which it is capable of affording when it is reaped at the proper period of ripeness. All the kinds of grain do not shrivel alike when too soon reaped. Wheat shrivels the most, and it shrivels the more the farther it is from plumpness when reaped. Barley suffers next to wheat; and oats least of all. Oats being covered with a stout envelope, apparently retain their plumpness under every circumstance, though their light weight in the hand betrays their worthlessness. But oats possess the property of filling and hardening in the stook to a greater degree than the other kinds of corn. We once had occasion to cut down a patch of potato oats, to obtain a more convenient access to the ground on which the hay-stack was to be built. They were then full grown, quite plump, but not the least changed in colour towards ripeness. Unwilling to throw away any thing of the shape of corn, we caused the corn to be bound up in sheaves and stooked. These stooks remained in the field till the rest of the corn in it was led in, which was a much longer time than was necessary to prepare them for the stack. The corn was thrashed out from the stook, and in sample it was the brightest, silver-coloured, plumpest oats we ever saw. Next year a large patch of potato oats, in the same state, was cut down to make a space on which to lay down lime, and the result was equally favourable as in the other instance. Subsequently to these trials, we reaped both potato and common oats comparatively green, and in this way avoided ever after any loss by the wind or reaping. We tried four acres of wheat as an experiment in a similar manner, but it was nearly ripe, though not so ripe as it is generally allowed to be before it is reaped. The grain was fine, of good colour, very thin skinned, and yielded first-rate flour. The straw of it withstood the thrashing in the mill in a remarkable manner.

Barley withstands early reaping worse than wheat or oats. It not only shrivels much, but when it is reaped with any green on the grains, it assumes a bleached white colour instead of the rich golden-yellow colour which it always exhibits when not discoloured with rain. Barley may be more safely allowed to stand till fully ripe than the other cereal grains, as it is not easily shaken with the wind. The awns will be blown off before the grains. Its ear lying at right angles to the stem turns away from the wind like a vane on a steeple. When too ripe, however, it loses its bright golden-yellow colour for a smoky blackened appearance, its ear crooks down rigidly towards the stem, and will snap off altogether with the wind or with violence. Beans, too, shrivel much when too early reaped. They should therefore be pretty ripe before they are reaped; but from the cautious manner in which they must be reaped, there is little danger of shaking the grains out of them. Wet weather, however, often causes their pods to burst after they are reaped.

It is difficult exactly to state the ripeness in which corn should be reaped to avoid the shaking out of grains. As a general rule for practice it may be recommended to reap the culmiferous crops before the uppermost grain can be shaken out either by the wind or in the act of reaping. When that period arrives must be learned by the state of the straw. It is impossible to derive this knowledge from any written description, it must be acquired in the field from personal observation, and afterwards confirmed by experience. If attention is directed to the acquisition of this experience, it will be acquired as easily as the experience which at present directs us to forbear to reap till a certain prefixed day.

We know much loss in grain is incurred every year by permitting the crops to ripen as much as they do at present. That loss is incurred in the reaping, binding, and stooking,—in the forking both in the fields and from the carts,—in the leading in the carts from the field to the stackyard,—and in the casting down the stack again and storing it in the thrashing barn. We cannot persuade ourselves to the belief that this loss is unavoidable. We are convinced it may be altogether avoided by reaping the corn before it is thoroughly ripe; and should the preparation of it in the field for the stack, inevitably cause a loss to be incurred in stacking, the loss in the process of reap-

ing would still be avoided. When we consider that the loss of a single grain from each ear is more than an equivalent for the seed corn, which is one-seventh of the whole crop; when we learn the magnitude of this loss, by reflecting that one-seventh of the produce of twelve millions acres of corn which are stated to be annually grown in the United Kingdom, amounts to the astonishing quantity of seven millions quarters of grain,—we shall not be thought too importunate by considerate people, in enforcing on the attention of agriculturists, the absolute necessity of using the only means in their power of lessening this national loss,—that of reaping their crops at an earlier state of ripeness than they have hitherto been accustomed.

ON PLUG OR CLAY DRAINING. *By W. S. Evans, Esq. of Selkirk House, Cheltenham.*

THE advantages of draining lands subject to springs is well known, and has been ably described by Elkington and others in various works on agriculture; but, as far as I am acquainted with these descriptions, they are chiefly confined to the best means of draining peaty and boggy soils, and such as are infested with deep-seated or more superficial springs. But there is a description of land of great importance as composing a very large portion of the soils of this country, which comes under neither of these denominations, and which has been almost wholly neglected, as the means hitherto recommended for its improvement have been either so expensive on the one hand, or inefficient in their effects on the other, as to preclude any advantages from their use. This land is capable of yielding remunerating returns when judiciously drained and under a good system of management; but without draining or skilful culture, this kind of soil is the most destructive of the capital of the farmer of any land in these kingdoms. The land now alluded to is chiefly composed of various depths, or of uncertain depth of vegetable soil of the superstratum or surface, which is incumbent on a subsoil of tenacious clay, exceedingly retentive of water, and rendered dry chiefly by evaporation. Gravelly and sandy soils, with ribs or beds of clay intersecting in various and uncertain

directions, are of no value without draining in a humid atmosphere like ours, and they set at defiance the best systems of farming. It becomes, then, a consideration of the first importance to the landlord and farmer, as well as the public, to devise means by which such land can be brought into profitable cultivation at a moderate expense, and to make these means as extensively known as possible. Plug-draining may be relied upon to effect this purpose, and at an expense so trifling in amount, in comparison with the advantages to be derived from its use, as will induce every landlord who may possess lands of the description in question, to apply a portion of his rents annually to this purpose. The farmer, under a rack-rent in the present depressed state of agriculture, cannot be expected, even if he has the means, to expend his capital in making permanent improvements on another man's estate. Draining should be done at the landlord's expense, beginning first with the arable land, and proceeding to the pasture-land, until the whole estate is completed. Should the landlord require a word of comfort or encouragement to prevail upon him to begin this experiment, I can assure him, that in numerous instances within my own knowledge, where the tenant has had his rent reduced, and has been soliciting a farther reduction, the landlord has been advised to put a value upon his estate according with the times; and any farther reduction that may be found necessary, the amount thereof is employed in paying the interest of the capital which the landlord expends in draining the land of the estate; and the results have been greatly to the satisfaction and advantage of both landlord and tenant.

It is usual to see good crops of corn, or the superior grasses, growing on the tops of the ridges upon this species of soil, and the furrows entirely denuded of every kind of vegetation, except surface-weeds and couch-grass; but, when furrow-drained, and the height of the ridges more or less reduced, the best corn and grasses are found in the furrows. If a calculation were made of the crops lost in the furrows, it would be found that the increased quantity and improved quality of the crops would more than repay the whole expense of draining *in two years*, and leave the land in a permanent state of amelioration and improved value

It is not sufficient to describe superficially any plan or practice in husbandry which is introduced to instruct a class of men who, generally speaking, have not had leisure and the means to fit them to investigate and appreciate the advantages and disadvantages of any new practice, by a mere general description. It must be placed before them in the plainest and clearest manner, because farmers are too prone to abandon, upon the first obstacle that comes in their way, the greatest advantages, rather than by perseverance to overcome difficulties. I have therefore given sketches, and a description of the different implements which are used in completing this process of draining, models of which I shall have the pleasure to transmit for the inspection of the Highland Society of Scotland on the first convenient opportunity. These implements will be found to perform their work most efficiently if properly applied.

Fig. 1.

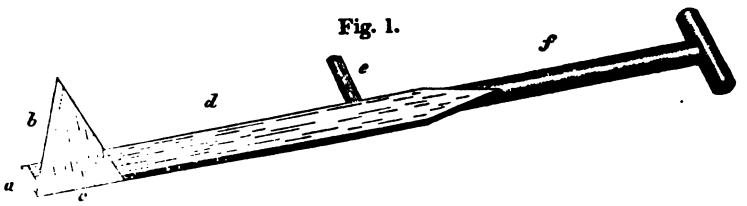


Fig. 1. is the bit or grafting iron; *a* the width of the bottom $1\frac{3}{4}$ inch; *b* the side-bit, length of cut 6 inches; *c* the width of the back of the side-bit, worked out of the main bit, which must be of the best tempered steel, $4\frac{1}{2}$ inches; *d* the length of the main bit from the step to the bottom, 1 foot 6 inches; *e* the treading step; and *f* the handle, which is about the length of a common spade handle.

Fig. 2.

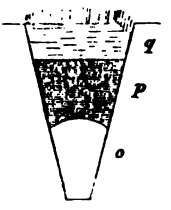


Fig. 2. is a section of a main drain, 2 feet deep, filled up again; *o* is the water-way left open, $8\frac{1}{2}$ inches high; *p* is the rammed clay above the suter or plug, 9 inches deep; and *q* is the returned turf, with the grassy side uppermost $6\frac{1}{2}$ inches thick.

Fig. 3.

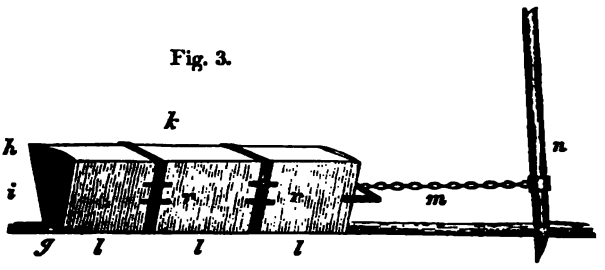


Fig. 3. is the main drain suter or plug; *g* the width at the bottom, $1\frac{3}{4}$ inch; *h* the width at the top, 4 inches; *i* the length of the plug, $8\frac{1}{2}$ inches; *k* shows the length of the suter, which may be divided into any number of pieces, say three or four, which are connected with one another by iron links on both sides, so as to allow the suter to turn a curve, *rr* the iron links which join the pieces *lll*; *m* the chain which connects the foremost piece with the lever *n*. A furrow-drain suter or plug is made $1\frac{3}{4}$ inch wide at the bottom, $3\frac{1}{2}$ inches wide at the top, and 6 inches in length. This will form a drain, the opening of which will be of the above dimensions.

Before commencing the operation of draining, the field to be drained should be carefully examined, to ascertain the proper fall; this may, in most cases, be easily discovered by the eye, but when there is any doubt, the spirit-level, or any other with which the parties are most familiar, may be had recourse to. Should the field be in ridges, and the subsoil composed of stiff tenacious clay, every furrow must be drained, to make the draining perfectly satisfactory, beginning at the bottom of the fall, and proceeding through the whole length of the furrow, and taking every precaution to carry the drain as straight as the land will admit of, as curves or bends in drains tend to obstruct the free passage of water, and to form accumulations of earth at every angle. Where bends are unavoidable, the suter or plug, fig. 3, is so constructed, that, with a little attention, it will adapt itself to any curve that may be necessary, and where there is no acute angles. It is advisable to use the line to make the first cut, until the workmen become expert both with the eye and

hand in finishing the work. The turf 12 inches wide and 6½ inches deep must be removed with the common spade, and when cut, should be placed upon the right side of the drain, with the grass uppermost. The cut in the clay is made with the grafting implement fig. 1; and it requires some skill and nicety to remove the second cut properly. The first cut being 12 inches wide, the second should be cut at such an angle down the side of the drain as will leave the bottom of the second cut the exact width of the tongue *b* of the bitting-iron fig. 1, at 9 inches in depth. The bitting-iron then completes the cuttings, by taking out the last cut 9 inches deep, and which will, on the whole, leave the opening 12 inches wide at top, 2 feet deep, and 1¾ inches wide at bottom, as fig. 2. The earth from the two last cuttings should be placed on the left side of the drain, that from the last cutting being uppermost, which, in filling in the drain, will come readily to the hand to be first returned back. Any loose soil that remains at the bottom of the drain should be carefully and completely removed by a scoop spade, so as to leave the drain perfectly clean before the suter or plug is laid in.

Having proceeded thus far in the work, the plug, fig. 3, should be placed with its narrow edge in the bottom of the drain, and which will, if the drain has been properly formed, exactly fit it. Now commences the most important part of the process, which is the well *ramming in of that portion of the clay last taken out by the bitting-iron*, as upon the proper execution of this part of the work depends the security and durability of the drain. This portion of the clay having been well rammed, and the pieces of the cuttings perfectly incorporated into one solid mass, the next cutting is to be returned in a similar manner, and equally well rammed; and, lastly, the turf must be placed as evenly as possible, and fixed in its original place by the rammer, which finishes the work, and leaves the drain, when the plug is drawn out, with a much larger water-way than can be obtained by any common draining-tile. This operation of ramming is performed to the full length of the plug, when the lever *n*, fig. 3, is stuck into the bottom of the drain, and the plug drawn forward to within 8 inches of the extent of the completed portion of the drain, and the work proceeds as before, until the

whole drain is completed. Great care should be taken that the whole of the earth which has been removed should be returned into the drain, the ramming being the hardest part of the work, the labourers, when left to themselves, are apt to leave too much of the soil out of the drain. The best criterion that the work has been properly executed, is, that the whole of the soil is returned into the drain, without leaving too great an elevation of the top of the drain above the level of the surrounding surface of the field. Four men and a boy (who is employed in returning the soil into the drain) are required to each drain, to carry on the work expeditiously, and the men may be changed to different parts of the work, but the stoutest labourer should take the ramming process. Never allow a weak man or a boy to be employed in this business. When the whole field has been drained, it should be well rolled with a heavy roller, and no cattle or sheep should be in the field during the operation, nor until the drains have had full time to become dry and consolidated. There should be as few outlets or main drains as possible, the outlets should be finished either with tiles made for the purpose, or with brick or stone if more easily procured; and I have found it eligible to spar the main outlets with some good oak spars, driven across to prevent rabbits and other vermin from entering. Never allow the drains to be cut across the fall, but follow the natural fall of the field, in whatever direction that may be. The only exception to this rule applies to main drains, which will, of course, be placed across the fall in the lowest part of the field, at any part where a good vent can be obtained for the water. In general, from 22 to 24 inches will be sufficiently deep to cut the drains upon pasture land; but strata may occur where the drains will be required to be cut deeper, when the size of the plug ought to be increased, and the main drain plug should also be made large in proportion to the quantity of water to be carried off, or more main drains must be made. The main drain plug should be larger than the furrow plug, so that two plugs of different sizes must always be provided. We have recommended that every furrow on certain descriptions of land should be drained, but with level land, and a more porous subsoil, from 24 to 30 feet, or even more, between the drains will effectually clear the land of surface water; but on compact stiff

clays the drains may require to be much nearer each other. The question should not be how few, but how many drains will be necessary effectually to obtain our object. We have seen upon gravelly and sandy soils, intersected by ribs or beds of clay, a single drain, judiciously placed, completely remove the surface water from 7 or 8 acres; and in fields of this character, where the ribs of clay are pretty regular, great expense may be saved by the use of the bar, to discover their exact situation, which, having done, we have only to cut drains through them, and give a free vent to the water, which has been confined above, to effect your object. In fields possessing a considerable fall, it will be advisable not to bring too many drains, or too much water, into the main drains, as the weight and velocity of the water may injure them; and where a large body of water in these situations must unavoidably be brought to one point, a covered stone-drain should be constructed with stones of sufficient size and weight to resist the velocity and pressure of the water. But, in general, with a little attention, the water may be so divided, in hilly situations, by increasing the number of the main drains, as to obviate any inconvenience from this cause.

Plug drains are more adapted to pasture than arable land; but where stone cannot be obtained, or where tiles are considered too expensive, these drains have been used with very great advantage, and when thus used they ought to be cut full 30 inches deep. I have executed, within the last four years, more than 300 miles of clay-drains to my entire satisfaction. At the same time, I am aware that some of this kind of drain, made by careless and inexperienced workmen, have failed; while I can with great satisfaction state, that not one of my drains has given way. To obviate any risk upon this head, I recommend that the workmen guarantee the work by giving security for its proper execution, or by leaving a sufficient sum in the hands of their employers, to guard against such a contingency.

One very necessary precaution should not be disregarded, that clay drains, nor indeed any other kind of drain, should never be made in frosty or snowy weather, as drains made under such circumstances will not stand; nor should sheep or any other kind of

stock be suffered to depasture on land while it is under the draining process, nor should the drains be left open even for a night, but the cutting of one part and filling in of another should be simultaneous operations.

The advantages of plug-draining are so many and important, that it is quite surprising how little of it has been executed. Pasture land, which before had been deluged with surface-water, has, in less than two years, undergone an entire change of character,—the aquatic grasses, with rushes, which, before draining, were its chief produce, having entirely disappeared, with various other weeds, whose chief support was derived from water, and their places have been supplied by several of the best and most nutritive grasses, with vast increase, both in bulk and quality. Mowing has commenced a fortnight or three weeks earlier than before the land was drained; and land that had, in wet seasons, invariably rotted, not only every sheep, but heifers and colts, is now stocked without such casualties occurring. It has given great comfort also to stock, which must necessarily be sometimes out in cold and wet seasons, and the chief resting-place for these animals is now in the furrows, which, before draining, were, in the winter season, several inches under water. There is now no wear and tear of waggons and horses, no cutting up of land in drawing on and off the materials of draining upon the old system. Though last not least, the very moderate cost of executing the work, which will not amount in ordinary cases to 1½d. per yard, is a great consideration for improvers of land in these depressed times.

'The system of clay-draining, as practised here, has been carefully examined at two different times, by Mr Wallace of Kelly in Scotland, M. P. for Greenock, to whom I sent a set of the tools in use here, and have had the pleasure of hearing from that gentleman, of his having put our plan of operations successfully to the test on his own estate. It is now therefore within the reach of any of his countrymen, who may choose to apply for farther information on the subject in that quarter.

ON THE CULTURE OF THE STRAWBERRY.

It is a common remark, that "good farmers seldom have well kept gardens," and there is no denying, that many instances of slovenly gardening occur where farms are kept in the best condition. But if this remark admits of a general application, it is not easy to discover the reason why it should be so. Gardening and farming are closely allied arts; in both the highest possible produce from the soil forms the chief object of the cultivator; and it cannot be denied, that minute attention to the best modes of raising the numerous tribes of garden fruits and vegetables, is followed and rewarded by an intimate knowledge of those principles of vegetation which will give the possessor a considerable advantage over the mere routine farmer. Nor is the art of farming necessarily so engrossing as to demand the undivided attention of men of ordinary genius every hour of the day. It is therefore to be hoped that the maxim quoted above will not, in this age of improvement, be much longer allowed to stand as a libel on the intelligence and industry of our farmers. Believing that we shall have the good wishes at least of the "fair" portion of the "landed interest" in enforcing the necessity of a well kept garden, and knowing that they have no objections to "a dish of fine strawberries smothered in cream," on the table after dinner as a dessert, during the sultry weather of June and July, and some fine fruit to preserve, as a sweat-meat at tea, on gala days, without going to market, we shall offer a few practical hints on the culture of this delicious and wholesome fruit. We suspect, when our farmer had read this preamble, his better half will hear him mutter, "strawberries indeed," they would soon overrun the whole garden;" so would couch-grass, we would answer, overrun the whole farm, if it were permitted to do so, but both can be kept within bounds.

Supposing that strawberries are to be planted, the preparation of the ground claims the first attention. A spot about ten yards square, not amounting to three falls of ground, will surely not be grudged for the production of this luxury. In the end of autumn, let fourteen barrowfuls of dung, which is about an ordinary cart-load, be carried to the place, open a trench on one

side, about 15 or 18 inches deep, if the soil permit it, have it all trenched over to an equal depth, mixing the dung intimately with the soil in the course of the operation. Recent horse-dung may be applied, where the soil is of a cold or stubborn nature, and cow-dung, not much rotted, where the soil is light and sandy; fill in the last trench with the earth taken out of the first, and leave the surface of the whole as rough as possible, to pulverise with the winter frosts. Early in March dig the ground over a spit deep, breaking it well, and leaving it smooth on the surface. The next thing to be attended to is the selection of plants, and on this much of the future success of the crop will depend. Of late years, a great variety of strawberries have come into use, which has thrown most of the old sorts into the shade. The following sorts will be found very prolific, and of easy culture, and surely a respectful application by a tenant to a landlord, for permission to his gardener to furnish him with a few runners, which otherwise would be destroyed, will be met with a ready compliance. The Groves-end Scarlet is early ready, amazingly prolific, and excellent in quality. This berry makes a beautiful preserve. Keen's seedling is a dark-coloured large berry, bears well, and is a general favourite; it is ripe soon after the Groves-end scarlet. The Bostock strawberry succeeds Keen's seedling, the first ripe being about a week later; it is, when well exposed to the sun (as all strawberries should be), of a light scarlet colour; its principal merit is the heavy crop it bears. The old Chili is also a hardy plant, and a full bearer. Many other sorts might be mentioned, such as Bishop's Orange, Wilmot's Cock's-comb, &c.; but where the first four mentioned varieties can be procured genuine, they will form a sufficient variety for the farmer's table, and it is for them we are now writing. Having the ground prepared, and the plants brought forward, the rows should be marked two feet apart, the Groves-end scarlet should be planted about a foot, and the other sorts about fifteen inches from plant to plant in the row; at this rate four hundred plants will fill the spot.

The ground should be kept clear of weeds throughout the summer months. Some advise the runners to be frequently pinched off in summer, others suppose they prove rather beneficial than otherwise to the mother plant, in the early period of

their growth; but all agree that it is necessary to remove them in the end of autumn. As to digging between the rows in winter, practical men are not altogether agreed; if digging is at all resorted to, the ground should only be stirred two or three inches on the surface, as deep digging must injure the roots, and hurt the fruitfulness of the plant. Little fruit will be forthcoming the first season, except a few on the Groves-end scarlet and Keen's seedling. The future crops for the three following years should average about forty imperial or Scots pints yearly, if the ground and plants are managed as above directed. As the ground will be exhausted in four years, it will be necessary to make a fresh plantation, in proper time, for a succession; and when the fourth crop of fruit is removed, the ground should receive what is termed "a half trench," laying the strawberry plants with about an inch of the surface-earth paired off, in the bottom of the trench, to be covered with a deep tramp of soil, left rough for a few weeks, when some dung may be pointed in, and the ground laid under a crop of winter vegetables. These lengthened directions may make the expense and trouble of raising the strawberry appear great, but when every possible item, rent, dung, and labour, are taken into account, it will be found that the fruit fresh pulled will not exceed half the price charged in the market, where it is often so disfigured by carriage and keeping, as to require a little nerve, as well as a large supply of cream and sugar, to make it palatable.

G.

ON THE OBJECTS AND EFFECTS OF THE LATE FARMING SOCIETY OF IRELAND.

THIS institution, which was dissolved in the year 1828, commenced in the year 1800, not only under the auspices of the chief nobility and gentry of Ireland, but with the full concurrence and patronage of the government, and with the specious advantage of parliamentary aid; which patronage and assistance were considered as a boon to the landed interests, at the precise era of the legislative Union between the two countries.

In order to appreciate what has been effected by the Farming

Society of Ireland, it will be necessary to revert to the state of agriculture previous to its establishment; and any person of the present day who wishes to be convinced of this, need only select the worst farming in the least improved district of the island, and suppose *that* spread over its entire surface.

A very few wealthy and resident proprietors had, before that period, imported some improved implements, and used them on their own demesnes. Little public benefit, however, is found to accrue from individual experiment, usually considered difficult and fantastic by the small farmers, who are, not very unreasonably, alarmed at the cost, rather than benefited by the example. Therefore, as *now* in *many* places, so at *that* time *universally*, the operations of husbandry were performed with *implements* of husbandry of the rudest and most defective construction, drawn by miserable half-starved horses, yoked without the intervention of iron in any shape, and furnished, as to halter, collar, and back-band, with ropes of twisted straw *. With such wretched implements the ground was inadequately tilled, and the produce proportionably circumscribed; and yet, by repeated cropping, the soil became perfectly exhausted, and was uniformly left to recruit itself *at leisure*, without the aid of grass seeds, or any other mode of preventing its being overrun with pernicious weeds. In this neglected state the country was in general found, at the time when the Society was instituted; and though it was impossible at once to eradicate such prevailing mismanagement, yet the influence of its operation (as will be admitted by any candid and judicious observer) has had a corrective effect in many places, and in some has led to the best farming practice.

The Society commenced the agricultural improvement of the country by encouraging the importation of Breeding Stock—a first step, which, to a superficial view, might appear not unlike an Irish blunder—but, with a wise foresight, the Directors of the Society considered this method, exclusive of its intrinsic value in the improvement of the live-stock of the country, to be

* Independently of the *pomp* of such farming preparation, the writer of this article witnessed, about that period, in a remote part of the west of Ireland, a harrow drawn by two colts yoked to it by the tails; and in the south, he had an opportunity of observing a handsome sowing of flax harrowed in by an inverted turf-kish, drawn by a man and pressed to the ground by a woman who followed.

that most likely to insure an improved *cultivation*, concluding fairly, that fine animals, at high prices (imported not only with the patriotic object of national advantage, but with the admissible vanity of acquiring fame and remuneration by the prizes obtained) would require *fine feeding*, beyond the usual pasturage even of this verdant isle, and that, in order to exhibit them at the cattle shews of the Society in creditable condition, all the machinery of improved husbandry must be called into action to produce the different kinds of artificial feeding, by the use of which alone success might be expected, and which no common grass feeding could accomplish. The summer pasture was well suited to the breeding stock exhibited at October; but the fat cattle for the spring prizes were to be treated in a different manner, and the turnips, mangel wurzel, &c. grown for their consumption would superinduce the necessity of the best tillage, through the medium of improved implements, improved practice, and abundant manure, to be supplied from the stables of the animals necessarily housed in winter, to give them any possible chance of succeeding against a formidable competition. This periodical accession of manure might naturally be expected to produce an improved rotation of crops; and thus it may be justly stated, that the encouragement of an improved *stock* could not fail in a great degree to establish an improved system of agriculture.

This, however, would be chiefly confined to those who had the means of purchasing and preparing for such valuable stock; and although the foregoing useful results were actually manifested in every instance where that was the case, the benefit could not, as has been remarked, be expected to pervade the middling and lower classes of farming occupiers. To spread improvement through these classes, great encouragement was given to local Societies, whose premiums were sanctioned, and, in many instances supplied, by the Farming Society of Ireland. This measure was attended with speedy and manifest advantage, particularly in the ploughing matches, where the skill acquired enabled the small farmer, holding his own plough, to compete with the best ploughmen (and in some instances successfully) at the great annual matches of the Society in the vicinity of the metropolis. A working farmer of this description was, in one

instance, fortunate enough to win the great handicap cup of the Society, value L. 70, which, as he might lose it the *next* year*, to avoid risk in every way, was commuted, with his full approbation, to a *certain* money payment of L. 10. The good effect of this was astonishing: it proved to the small farmer that the *gentry* were, notwithstanding their superiority in apparatus, still placed in impartial competition with the industrious holder of his own plough. Indeed, in this respect, the leaning of the Society was always to the working farmer; for, at all the matches, there were two classes, one for the gentry, the other for the farmers. The former were prohibited from competing with the latter, whilst the latter had every prize (even to the great cup) thrown open to them in both.

The advantages of these numerous local and district matches were incalculable; and these advantages were considerably enhanced, and widely disseminated, by a most liberal distribution of Scotch ploughs of iron to working farmers, whose industry and sobriety should be certified by the clergyman of his parish, and by a resident member of the Society. Upwards of 200 gratuitous ploughs have been given in this manner within the year. Wherever they were sent, a new era took place in the order and cultivation of the farm. The sharp-witted Irish are sensible to ridicule; and the small farmer, formerly content with the vile old plough, and its miserable accompaniments, upon receiving one of iron, with a handsome set of painted swingle-trees, thought it "*too bad*," as he would express himself, to have it drawn "*in the ould way*," and in downright shame would strain a point to make a hempen back-band, horse-skin collar, and winkered bridle supplant those articles in former use of fragile and temporary manufacture from the flail. He would, moreover, try to *swap the ould mare for one of a stronger sort*; and, gaining something *better* in the horse way, would perhaps be dismissed by a patch of clover or vetches, to provide something extra for the animal's support;—and thus a gradual improvement imperceptibly took place under the fostering care and superintendance of a judicious agricultural society. To farmers of better means, ploughs and harrows were given at reduced prices,

* The final possession of this cup was only to be obtained by three always-year award to the same person for the best ploughing.

to tempt them to the adoption of good implements; and to save the cost and delay of importation, an implement factory was separately established, with the sanction and liberal assistance of the Society, and the best models being sought in England and Scotland, for all the useful implements, they were executed in this factory in the most correct manner, thus creating and supplying an extensive demand. Here, also, apprentices were received, and journeymen were instructed, for the purpose of conducting local factories throughout the country, where in many instances they have met encouragement, and are at this day of the greatest advantage. To teach the use of the improved implements, skilful persons, employed by the Society, were sent to all who made application for them, free of cost, and did much good in this way. The material knowledge of draining, of ploughing, of using the drill-machine, &c. and even the sleight and management of the Hainault scythe, was thus spread abroad. The application of the latter implement, however, made but little progress, though general in Flanders, and introduced into England with great success by the late Mr Rose, M. P., who, from his zeal in the promotion of agriculture, sent his own men to the Society, to spread the use of it in Ireland. It was yet too difficult, and too *expeditious* for the Irish labourer. Exclusive of the general aversion to any thing new, there exists a particular objection to any thing calculated to abridge labour; and this, in a dense population, would appear natural: it was not understood that every facility given to the farmer, by improved implements, of taking advantage of an uncertain season, or a rising market, adds to his power of employing profitable labour, on an increasing scale, though it may diminish his demand for hands in some particular branches of his farming management. Prejudice thus prevailed against the introduction of the Hainault scythe, an implement as accurate in its work as rapid in its execution, and by which one man can perform the usual sickle work of two. The drill-machine has also, in a great measure, been given up, though the results with those who gave it fair trial might have encouraged its more extensive adoption. Upon an inquiry instituted at the request of Earl Talbot, the best friend to the agriculture of Ireland that ever filled the viceregal

station, a report was made, of which the following is an extract.

" Drilling corn crops, practised by about twenty persons in a great variety of soils, viz. in the counties of Kilkenny, Kildare, Sligo, Meath, Roscommon, King's County, Dublin, Tipperary, Louth, and Wicklow. The experiments were attended with general success.

" From those who kept accurate farming minutes, the following statements have been obtained.

" In the county of *Kilkenny*, Colonel Gore set apart three portions of 70 perches each, in a field of six acres (the worst part of the field, being but lately drained, and part of it moory quality), produced at the rate of 9 barrels * 16 stones of wheat, by the plantation acre †. The second produced at the rate of 11 barrels 9 stones by the same acre; and the third produced at the rate of 15 barrels 12 stones 13 pounds by the same; and the principal part of the six acres yielded at the rate of this latter produce. A field, equally divided, one-half sown broad-cast in October with twenty stones of wheat to the acre, carefully cultivated and top-dressed in the following spring—the other half sown with the drill-machine—produced at the rate of ten stones to the acre. The produce of the latter exceeded that of the former by two barrels to the acre. A field of eight acres, ploughed from the lea in June, fallowed, or, as it is termed, worked down, till October, then limed with thirty barrels (herring guage) to the acre ‡, sown with wheat by the drill-machine between the 5th and 16th of October, at eighteen inch intervals;—a second field of six acres, after potatoes, sown also at eighteen inch intervals, between the 16th and 25th of October; both fields hoed four times—a bad season, and great blight; greatest produce, 13 barrels 14 stones; lowest produce, 11 barrels 6 stones 8 lb. by the acre. The ears of wheat were considerably larger than in the narrower drills: eighteen inch drills not only give more grain than at narrower intervals, but more

* The barrel of wheat is twenty stones, of fourteen lb. to the stone. That in broad-cast, eight barrels is thought a fair return.

† The plantation acre contains 160 perches of 21 feet each.

‡ Unless a *different* acre be specified, the plantation acre is always intended.

sheaves by the acre, in the proportion of three to two. The same fields, sown in the same manner with oats the following year, yielded thirty barrels of fourteen stones each by the acre.

" Mr Latouche of Harristown, in the county of *Kildare*, sowed wheat at *twelve* and at *eighteen* inch intervals. The former, the best crop, produced twelve barrels by the acre, choice grain. Mr Bushe sowed wheat after potatoes, at intervals of twenty-four inches, and reaped 13 barrels 15 stones by the acre. He tried double rows, on Tull's system, nine inches asunder, with an interval of thirty inches—crop deficient. Mr Latouche made the same experiment, and found it so very inferior in produce to that of the single rows, he relinquished it altogether. Mr Hacket sowed wheat at from twenty-four to thirty inches intervals. Produce ten barrels by the acre.

" In *King's County*, Mr Powel sowed wheat from 24 to 30 inches. Bad season and blight. Produce nine barrels by the acre: and in the county of *Roscommon*, Mr Radcliff sowed all his crops, of every description, for some years with Cooke's drill, and with the fairest results. Produce twenty barrels of *oats* by the acre, from fourteen stones sown at twelve inch intervals; and of *wheat*, twelve barrels by the acre, from ten stones of seed sown at the same interval. In both cases a superior crop of clover. To effect this, the intervals were stirred by the scarefiers of the same machine in April, and the clover sown, as it were, *broadcast* by the cups, the pipes and coulters having been removed.

" In the county of *Dublin*, Colonel Vesey of Lucan sowed nine bushels of Talavera wheat 60 lb. each with Cooke's drill, at twelve inch intervals, and reaped thirty-nine barrels fifteen stones and a half. In the counties of *Meath*, Mr Grainger and Mr Garnett; in the county of *Sligo*, Mr Wynne; in the county of *Kilkenny*, Sir Richard and Mr Robert St George; in the county of *Tipperary*, Mr Lewis; and in the county of *Wicklow*, Mr Tottenham and Dr Truell,—all made use of the drill machine, either Cooke's or Mr Doogal's, with perfect success, but omitted to note the results in precise detail."

The foregoing is a sketch of the report made by the Society, at the request of Earl Talbot, then Viceroy of Ireland; and from the drill system having succeeded in so many counties, embracing so great a variety of soils, the directors were induced to encourage its continuance by prizes, and to obviate the chief ob-

jection of expensive implements, they offered a premium for that purpose, which produced a well contrived seed-box annexed to the Scotch Plough that sowed a single drill with great accuracy; nevertheless the practice of this system, though generally approved, has rather diminished than increased. Those premiums were not limited to the object of drill husbandry; but extended to all descriptions of implements that could be beneficially applied to improved cultivation.

The next great object was to stimulate local societies to a superintendance of minute improvements that could not come within the agency of the parent society, and also to adapt the improvements they encouraged to the nature of the districts in which they were applied. That of Wicklow being within reach of their operations, experienced much of their attention and derived corresponding advantages, which are obvious at this day. Not to speak of the cultivation of its fertile valleys by the introduction of good implements, and imported seed corn, its mountains were also made the scene of great improvement in their native flocks of sheep. These had been a miserable race of animals, extremely small, bearing no flesh and very little wool, 2 lb a fleece being the usual quantity: this, however, was of good clothing quality. The attention of the Society in providing the flock-masters with South Down and Merino sires, not only improved the weight and quality of the wool, but also of the mutton, which is much sought for, and with a year's feeding on good pasture will arrive at 16 lb. or 17 lb. a quarter, whilst the improved fleece will yield from 4 lb. to 5 lb. of wool. To spread the fine-woolled flocks over the mountain pastures of Ireland, the Society instituted prizes for the best cloth made from wool grown in Ireland, and opened stores for the reception and sale by auction of Irish grown clothing wools. The extraordinary prices which were procured formed no standard of real value, but the competition which was thus excited among the manufacturers, for the best parcels produced a corresponding exertion amongst the breeders to import the best fine-woolled flocks, and thus the object of the Society was accomplished; a mountain stock was multiplied and improved so much, that the fleece of the improved mountain crop described above, was not only nearly double the weight of that of the unimproved native wool, but also brought a ible price by the pound.

A most beneficial change in the quality of agricultural produce was effected also by the Society's encouragement to the importation of seed-corn. Handsome prizes also for the best grown from that which had been imported, excited a competition not only amongst the merchants but the farmers; and the result was a rapid and general improvement in the quality of grain and corn, which raised the character of Irish produce in the English market, and, of course, the rate of purchase for samples which had till then been of inferior quality and price. The writer of this article, on a visit to London in 1824, carried with him many specimens of grain of Irish growth, which were allowed by the chief factors at Mark-Lane to equal any which were exhibited there for sale. This circumstance having confirmed the value of the improvement, an additional stimulus was given to importation, and the prize corn was greedily bought up at prices which, however high, interfered but little with the farmer's remuneration in the succeeding crop. It is a maxim, that seed brought from a distant soil will yield an increased produce, if well selected; also in point of quality the advantage must be of infinite importance.

The Cattle Premiums of the Society likewise rank amongst its most useful exertions and effects. They have been already mentioned as the basis of good *cultivation*, but their *intrinsic* value is exhibited in most parts of Ireland at this day, by the improved nature of the live-stock of the country. This stock, in its different kinds, at the first institution of the Society, was very differently circumstanced in point of native merit. The horned cattle of the plains possessed some advantages. The natural richness of the pasturage was calculated to cover defects of shape, besides that, some forty or fifty years before, there had been introduced a cross of Lancashire cattle, which left behind it obvious traces of improvement. In the year 1800 the Society observed that the great proportion of the black cattle of the country were of the long-horned breed. This conclusion was fairly drawn from the character of those which were produced for sale at the great mart of Ballinasloe, where, amongst 5000 oxen, annually purchased, not a single lot of any other kind could picked out. These were truly *long-horned*, and, as they h been collected there from all the breeding counties of Ir it was obviously to be concluded, that the general sto

country was long-horned. These oxen were of respectable outline, and considerable weight, but coarse in their bone, defective in form, and not possessing the profitable quality of early maturity. To remedy these defects, without interfering with the established breed, the Society encouraged the importation of the half-long-horned breed of Leicestershire, and many noblemen and gentlemen provided themselves with magnificent animals of both sexes, from the stocks of Princep, Honeyburne, and Astley, at enormous prices, not however disproportioned to the value of the improvement which they were capable of producing, and did really effect, in the long-horned stock of the country. This was shortly proved by the production of animals of that description, with improved shapes, and finished for the market at an early age. The Society, however, did not limit their encouragement to that particular breed, but gave *each* a fair trial, by holding out similar prizes in all the different classes, and this had the effect of producing many of the best *short-horned* animals from the stocks of the chief breeders of that improved and valuable kind; to such perfection had they been brought by Mr Collins and others that they combined the qualities of form, weight, and early maturity. They were not so well adapted to the amelioration of the general stock of the country as the long-horned breed *, but that they suited better the object of individuals for their own particular profit and advantage is not to be denied, and, in consequence, they have successfully rivalled, both in England and Ireland, the long-horned breed of cattle, so much to be admired and approved. But it is fortunate that the Society's exertions have established both breeds in this country with effect, and also the beautiful Devons, whose merit for the dairy and the stall, whose symmetry of shape, and facility of being fatted, as well as their adaptation to the lightest soils of Ireland, must always recommend them.

The *native sheep* also of the plains were not deficient in many profitable qualities; they were of good size in the rich pastures, of good wool, and of an excellent quality of mutton; but slow to fatten, uneven in form, coarse in bone, and light in

* We will soon be enabled to state such facts on the ameliorating influence of crossing any breed of cattle with the *short-horns*, as will no doubt cause our intelligent and much respected correspondent to alter his opinion on the comparative value of them and the *long-horns* for that purpose.—EDITOR.

fleece: all these defects were to be remedied by the corresponding perfections of the new Leicester breed, the introduction of which was encouraged liberally by the Society, and a permanent improvement was thus extensively established throughout the country. From 80,000 to 100,000 sheep are annually produced for sale at the October fair of Ballinasloe; and the astonishing improvement effected by the new Leicester cross can be duly appreciated by those only who witnessed the quality of the sheep stock exhibited there previous to the formation of the Society, and in the years which followed its institution. The South Down and Merino breeds, with their crosses on the native mountain sheep, also met great encouragement from the Society; but, however valuable in point of clothing-wool, and excellent in point of flavour for the table, they have not been considered to deserve much consideration as profitable market sheep.

The *native swine* was the only stock of the country of decided inferiority, and appearing to possess no one redeeming quality, except that of a good description of flesh, *when it could be produced*, which was only to be effected by long and costly feeding. Nothing was more disgusting than the lob-eared, heavy-boned, flat-sided, ghastly form of the old Irish hog, which has now disappeared, from the judicious crosses encouraged by the Society, and introduced chiefly from Leicestershire and Berkshire. This improvement was as rapid in its progress as it has become general in its effect. The facility of importing the best breeds at an early age, and at no very extravagant cost, and the encouragement of the Society, induced numerous country gentlemen to make the experiment; and thus, with considerable profit to themselves by future sales, an improved breed of this most useful animal has been universally established.

By an original regulation of the Society, the adjudication of the prizes could not finally take place till the animals in competition were slaughtered, and till their weight and quality of flesh should be accurately ascertained. This circumstance afforded the writer of this article an opportunity, from the minute observation of succeeding years, of forming a calculation, and a short rule for ascertaining the weight of the *carcass* from the *live weight* of the animal to be slaughtered. This was considered an accurate rule by the Society, as well as by all those who were

in the habit of estimating the weight for the purposes of purchase or sale. It was formed by repeated and precise experiment, and is as follows:—That the live weight shall be to the dead weight (sinking offal) as 8 to 5. To find this; reduce the live weight to pounds, divide by 8, multiply the quotient by 5, the amount will be the dead weight. To bring into cwts., divide by 112; or by 14, to bring it to imperial stones. This rule has been found to answer very closely indeed in most instances. In those which follow, the coincidence between the result of the rule and the actual return from the weighing-machine was particularly correct. Lord Farnham's Devon ox was slaughtered in the show-yard. The live weight was precisely 12 cwt. Apply the rule: reduced to pounds, 1344 divided by 8 = 168 lb., multiplied by 5 = 840 lb., divided by 112 = 7 cwt. 2 qrs. This ox was slaughtered on Wednesday, and on the following day the carcass weighed exactly 7 cwt. 2 qrs. The slaughter was inspected by an officer of the Society; the result was as follows·

	lb.	oz.		Cwt.	qrs.	lb.
Blood, . . .	22	5				
Feet, . . .	18	0				
Head and tongue, . .	30	0				
Cock weight and kidneys, .	4	0				
Hide, . . .	84	0				
Heart, liver, and lights, .	25	0				
Guts and contents, . .	135	4				
Fat, ...	152	0				
Loss of blood, . .	8	7				
Offal,	479	0				
Live weight,	1344	0				
Nett weight,	865	0	or	7	2	25
Weighed next day,	.	.		7	2	0
Lost by evaporation,	.			0	0	25

The foregoing instance is very satisfactory, having come under the immediate inspection of the Society. Of other beasts exhibited, and a return of whose dead weight has been procured, the results are as follow:—Mr Nugent's Hereford ox, live weight, 16 cwt. 3 qrs.; calculation by the foregoing rule, 10 cwt. 1 qr. 24½ lb.; butcher's return of weight of carcass, 10 cwt. 1 qr. It is necessary to mention, that this was given from having weighed but one fore and one hind quarter.—Lord

Castlecoote's long-horned cow, live weight, 17 cwt.; calculation by the foregoing rule, 10 cwt. 2 qrs. 1 lb.; butcher's return of weight of carcass, 10 cwt. 2 qrs.—Colonel Battersby's prize heifer, live weight, 10 cwt. 2 qrs. 1 lb.; calculation by the foregoing rule, 6 cwt. 1 qr. 1 lb.; butcher's return of weight of carcass, 6 cwt. 1 qr. 10 lb. The application of the rule in the foregoing cases was attended by a remarkable concurrence; but in no instance has there been any material deviation from the actual weight of carcass. It must be observed, however, that these experiments were made upon the cattle of an improved kind, where the proportion of offal is not as great as in coarser and inferior animals. This mode of investigation, however, opens an easy opportunity to every feeder (through the medium of that most useful implement the weighing machine) to form his own rule upon every description of cattle he is in the habit of breeding, or purchasing for his stalls; and the frequent use of it in weighing cattle at stated periods, from their being laid in as stores to their being disposed of to the butcher, as well as the quantity of food consumed within the same periods, would not only lead to the absolute value of the animal in every stage of its improvement, but also to the precise profit or loss on any particular method of feeding. In a more extended point of view also, this species of knowledge being placed within the reach of every country gentleman, must tend considerably to the establishment of that best system of improved management which unites tillage and stock, and, by means of the latter, returns to the farm an uniform proportion of its produce in a state of manure, which, judiciously distributed, cannot fail to keep up a perpetual fertility;—from the adoption of this useful arrangement, many are deterred by their ignorance of the value of stock, and by the risk of low prices and uncertain sales. It is the butcher's trade to buy as cheaply as he can; his practice gives him information, and he speculates on the ignorance of the feeder; an equality of knowledge which, by the foregoing rule, the use of the weighing-machine would give, must in the end be more satisfactory to both parties. A fair profit to the butcher being once ascertained and agreed upon, prices either extravagantly low or high would cease to be proffered or demanded,

and, at the current price of meat, both parties might form their estimate secure from imposition or disappointment.

The extensive premiums of the Society for imported bulls to serve *gratis* were those that tended to diffuse the most general improvement: they excited great competition, and the result was manifested at the spring shows of fat cattle, where breeders, graziers, sales-masters, and butchers, had the best opportunity of establishing or correcting their judgment as to the intrinsic value and merit of the animals exhibited. At the spring meeting in Dublin also, bulls of one and two years old were exhibited for prizes, that from them might be selected sires of the different breeds, suited to the stock of the respective breeders. Imported bulls of more advanced age, which had served *gratis* in the different provinces, were shewn at the October meeting of Ballinasloe. To improve the draft horses of the country, imported sires, having served *gratis*, were annually brought into competition for liberal prizes. Spanish asses also were encouraged: in this class, however, there was but little competition, from the great difficulty of procuring sires of this description. The few that were introduced into Ireland have in some places given to the mule stock a character of superior strength, size, and symmetry.

The following list of premiums will shew the nature of the several encouragements to improvement held out by the Society; and may supply some useful suggestions for the adoption of future agricultural institutions:

In 1815–16 *, *Corn Premiums* were:—For the best crop of wheat, barley, oats, and beans, on five statute acres, L. 50 each; for the best crop of wheat, barley, oats, and beans, on three statute acres, L. 30 each.—*Seeds*, for best vetch-seed, amount of premiums L. 18; for best mangel wurzel seed, amount of premium L. 30.—*Fiorin Hay*, for best crop on five statute acres, amount of premiums L. 100. Ploughs at reduced prices, L. 100, which cost to the Society L. 227.

Ballinasloe Show.—For young bulls of different breeds, amount of premiums, one medal and L. 40;—for bulls having served

* The several premiums in this list are condensed for brevity, instead of being given as they appeared, distinguished in all their respective classes. The rules and conditions are also omitted.

gratis in the different provinces, amount of premiums L. 690; —amount of premiums for the different breeds of heifers and cows, four medals and L. 120;—amount of premiums for the different breeds of sheep, six medals and L. 120;—amount of premiums for swine, L. 20.

Dublin Spring Show, 1816.—Amount of premiums for the best fat oxen of different ages, two medals and L. 45; for fat cows and heifers, one medal and L. 60;—amount of premiums for the different breeds of sheep, two medals and L. 165;—amount of premiums for swine, one medal and L. 16;—amount of premiums for the different classes of ploughing matches near Dublin, the great silver cup (to be challenged), value L. 70, a silver cup, value L. 10, or two iron ploughs, &c. value L. 12; and amount of cash premiums, L. 106;—amount of premiums for ploughing matches * in each of nine districts, one medal and L. 45; amount for the nine districts, L. 405;—amount of 27 medals, as above at L. 1, L. 27. Total premiums offered for the twelve months by the Society, L. 2531.

The great advantage of the premiums given to encourage good ploughing in the different districts, may be estimated by the following extract from the Earl of Carrick's report of that which took place near Kilkenny in the same year, at which forty-two ploughs started. "The best judges in the field (and there were many of considerable experience) declared that they had never witnessed a superior display of ability. The spirit of emulation which animated the rivals, imparted itself to the surrounding thousands, who shewed the most anxious interest in the decision. We trust that such capabilities will not be neglected, and that the Farming Society of Ireland will continue its fostering care, and encouragement to progressive improvement."

The premium lists were annually arranged with great attention, and annually varied as to extent and application, accord-

* The Society, on a written application from three of its members, who should undert ke the adjudication, offe ed to give premiums for the improvement of seed-corn in each of the counties of Ireland. If landed proprietors in any part of the country, would give pecuniary aid, and undertake the adjudication of local premiums, the Society offered to assist with a proportion *of their* funds.

ing to the fluctuation of the Parliamentary Grant, and the farming circumstances that called most loudly for improvement. The lists here presented for 1815, are selected as belonging to a year which formed an era in the Society, being that in which, after long and satisfactory trial of its utility and effective energy, the late reigning monarch, George Fourth, was graciously pleased to grant to the Society the honour and boon of his Majesty's Royal Charter of Incorporation. The respectability of this flattering acquisition, was strongly marked at the October meeting of that year at Ballinasloe, by the corresponding efficiency and exertion of the Directors. Indeed, that patriotic assembly for many years took precedence of all public agricultural meetings in every other country, in point of numbers and respectability. It was a meeting which was attended by the first nobility and gentry as chief officers and directors of the Society. It was patronized by successive Viceroys. A Bedford thought it not beneath him to sanction it by his presence, and by the liberal donation of many valuable sires. It was cherished by a Talbot, and fostered not only by his high and personal approbation, but by his practical knowledge and assistance, as well as by a continued succession of munificent premiums from his own private purse. Such a meeting will naturally be referred to with respect in the annals of the agricultural world, and with great justice, as it was scarcely more to be praised for the effective and zealous application to the business of the day, than for the liberal spirit of unbroken harmony in which all parties joined in the conviviality of the evening. The Reception Rooms have often accommodated 200 guests, collected from each province of the island, besides many visitors from England, Scotland, and from foreign countries, and the scene has been uniformly one of good will, good temper and good manners, devoid of sectarian animosity, party politics, excess, or irritation,—always conducted with [illegible] and hilarity, and always terminating in good humour.

It was considered that a Society of this nature might have done much, by its continuance, towards the amalgamation of parties in this distracted country; but the experiment was interrupted, and the Society dissolved, by the withdrawal of Parliamentary assistance. Whether its members were unreason-

able in calculating on the permanence of this aid, or the Government wise in withdrawing it altogether, is not now the question. The result has been the dissolution of a Society which manifestly promoted the combined interests of landlord and tenant, and spread improvement through many parts of Ireland. The benefit derived from Parliamentary aid is very much counterbalanced by its insecure character. The interests of a public institution may be for a time promoted by such aid, but ruin seems to be the consequence of its cessation. Of this the reasons are evident enough. In the present case the retrospective eye of experience, can trace back the seeds of dissolution to the very assistance which seemed to constitute prosperity. Were it possible to *secure* the receipt of a given sum for a *certain* number of years, which could be appropriated so as to create a permanent fund, however small, it would be valuable in its *certainty*; but Parliamentary assistance is granted *annually*, and must be expended according to the strict appropriation of a specific estimate. In the instance to which we refer, it was thus appropriated to the expenditure of extensive establishments in the metropolis, and in the country, upon premises at high rents, which, however, mainly advanced the objects of the Society while the funds were continued, but which, (upon *their* withdrawal in the year 1828,) were of necessity surrendered or disposed of; and thus terminated a Society of twenty-eight years' standing, whose labours within that space of time had effected a widely spreading improvement in the agricultural and live-stock of the country. It may fairly be asked, whether, even under the discontinuance of Parliamentary assistance, a Society of this nature, composed of all the chief nobility and gentry of the land, might not have righted itself, and continued its prosperous course, by means of individual subscription? And this very natural question is only to be answered by a brief statement of facts.

The original terms of subscription were:—L. 1 yearly, or L. 10 to constitute members for life. The latter was the mode of subscription generally adopted, and its proceeds, with all other moneys, were annually expended on the rents, buildings, establishments, and liberal premiums of the Society. The yearly subscriptions were difficult in the collection, and fell into a great

and irrecoverable arrear, and thus, after a time, the annual grant became the only resource;—that ceased, and the Society was no more. A few patriotic and public-spirited individuals made considerable exertions to revive it, but in vain. The yearly subscribers in arrear were not those from whom aid could be expected,—the life members could not brook the idea of a renewed subscription. All had fondly hoped the grant would never have been withdrawn. In this they were disappointed; and prudence, however late, suggested the propriety of getting rid of the premises altogether, rather than let heavy rents accumulate without funds for their discharge. The same consideration determined them to apply the funds in hand to the liquidation of all pecuniary engagements. Thus may be explained the sudden cessation of so great a Society, instituted with zeal, and conducted with energy and vigour;—a Society which always held the agriculture of Scotland in the highest estimation and respect,—which adopted much of her practice and many of her implements, with which, had they contrived to import also the seeds of her prudence and economy, they might still have to vie even with *her* in national utility. In that respect, whilst the Society continued in existence, it could not fairly be charged either with want of skill or of success.

In conclusion, however, it is satisfactory to observe, that the exhibitions of improved stock have lately been renewed by the Royal Dublin Society, and still more satisfactory to learn, that some gentlemen of property and public spirit are at present contemplating the formation of a general Society of Agriculture. We have in the foregoing statement given a succinct account of the rise, progress, and dissolution of the Farming Society of Ireland. But we could not, without widely transgressing the necessary limits of a paper of this description, offer any thing of an adequate view of its extensive and beneficial operations, or of the valuable traces they have left behind them. The experienced reader will readily infer them from the facts; and to every reflecting person such facts and such consequences contain the best lesson, both upon the actual policy of Governments, and the true method of pursuing the interests of this country.

R.

ON THE AGRICULTURE OF THE COUNTY OF WEXFORD IN IRELAND.

We have already noticed the striking peculiarities of two baronies, Forth and Bargy, in the county of Wexford. We shall now take a general notice of that county, and afterwards compare it with Galway on the opposite side of the island, and in a different province.

The county of Wexford contains nearly 400,000 English acres, and is divided into eight baronies. Of these, large portions are possessed by absentee proprietors, who annually abstract several thousands of pounds from the country. In *Shelburne*, one of the baronies, there is scarcely a resident magistrate. *Bantry* has its principal proprietor, Mr Carew, a gentleman who in every respect fulfils the duties of his station, and always resident during the Parliamentary recesses. His wooded demesne at Castleboro exhibits the results of tasteful improvement; and his tenantry manifest in their habitations, their gardens, and their fields, proofs that the eye of a landlord, and of a *landlady* too, has rested on them; and that a system of agricultural premiums, judiciously bestowed, and education usefully applied, have produced their natural effects.

The beautifully situated town of New Ross, on the river Barrow, is in this barony, where, from its local advantages, it *ought* to have a considerable trade; but alas! either from the injudicious policy of its proprietor, or the want of capital in its merchants, it holds a very humble rank in the commercial world. The little colony of Protestants at New-Ross, descended from the Palatine families, is one which presents that aspect of comfort, order, and improvement, which an agriculturist delights to view. The alluvial lands in the neighbourhood of Ross are beautiful and rich; but here Nature has been the principal artist, the industry of man has had little comparative share in rendering it fertile. Lime is procured in many parts of this barony at a vast expense of horse labour, and with a degree of industry not exceeded any where: it is brought from the adjacent counties of Carlow and Kilkenny. Indeed, throughout the whole county all is labour and activity, whether in ex-

cavating marl, drawing limestone over long and hilly roads, or gathering sea-weed from the shore. There is no marl in Bantry, nor in any of the western portions of the county, after we recede a few miles from the Slaney.

Shilmalier has much to boast of in the way of improvement. The number of its resident landowners is considerable, and some of them have *really improved* their properties in every respect. The roads, farms, and cottages, which environ the demesnes of Mr Hore at Harpurstown, and Mr Harvey at Kyle, would be admired in any country.

Ballaghkeene has hardly a resident proprietor of the large class. A part of Lord Courtown's beautiful demesne, and of his lordship's estate, is in this barony, and is the best specimen of it. Mr Doyne of Wells also possesses a well-laid-out demesne, and pursues the best system of husbandry on his farm. Mr Richards is an improver, like Lord Courtown, and a first-rate country gentleman. There are a few other proprietors who are valuable residents, but, considering the great superficial extent of this barony, it is wofully unimproved, and still more wofully *disembarrassed* of resident owners. There are parts of it from which the proprietor is a constant absentee, and the agent of which lives in Dublin. There is little or no limestone in this barony, but marl abounds in it; the mode of using which is as follows: from 700 to 800 car-loads are laid on an acre of ley sod. After *twelve months*, when it has been sufficiently washed into the sod, the ley is ploughed *very lightly* in narrow ridges, and harrowed down, and wheat is then sown, and covered with a shovel from the furrows with earth, loosened either by the spade or plough. A second crop of wheat, or one of potatoes followed by wheat, succeeds.

The barony of *Gorey* is much more improved, possessing a respectable yeomanry and many resident landlords—Lord Courtown and Mr Beauman of Hyde Park among the number, and a considerable number of smaller proprietors. This barony, from having been during a long series of years the chosen ground for ploughing matches, and the head-quarters of an agricultural society, exhibits superior specimens of ploughing skill. This superiority appears in the excellence of the teams, and form of the ploughs (which are frequently of iron), and in

the straitness of the furrows and the depth of the ploughing. The cars, carts, and other implements of husbandry, have also considerably improved.

Of *Scarawalsh*, a vast portion, like that of Bantry, is mountainous or hilly, wild and barren. The most improved parts of this division are those about Newton-Barry, one of the most beautiful villages in Ireland. Lord Farnham, its proprietor, is sometimes resident. Of the lessor proprietors, Mr Derinzy of Clobemon Hall is decidedly the greatest improver, both in his farming stock and agriculture. He plants a good deal, and successfully, and altogether furnishes to the gentry and farmers around the best specimens of agriculture. He is also an admirable horticulturist. This gentleman's mode of planting merits observation. After he has ploughed and harrowed down his ground as if to receive a corn crop, he draws shallow drills, six feet apart, and into these are dropped, by women or boys, three year old trees, three feet asunder. After laying down the trees, the women or boys, as they proceed, draw a little earth with their fingers to keep them in an upright position, before the advance of the plough, which (drawn by slow and steady cattle, and guided by a good pair of hands) will lightly mould up the trees in the furrow. By this process Mr Derinzy has planted upwards of twenty Irish acres, at the following expense per acre:

4000 three year old trees, at 8s. per 1000,	L.	1	12	0
8 boys or girls, at 6d. per day,		0	4	0
7 men, including the ploughman, at 1s. per day,		0	7	0
A pair of horses,		0	5	0
Previous preparation of the land by ploughing and harrowing,		0	12	0
	L.	3	0	0

Mr Derinzy is so pleased with the results of his experiment, that he will plant in this way 100 acres of light gravelly soil. The trees which he plants are oak and larch, in alternate rows: in sixteen or eighteen years the proprietor will probably cut down the larch, which may pay forty shillings an acre for the land from the time of planting. There will then be an oak wood standing of considerable value. The young trees are planted in rows at the narrow interval of three feet, in order to

afford a supply when wanted, for removal to ornam
tions, fences, &c. In some places Mr Derinzy inte
tings of *laurels* and *holly* seedlings, as shelter for g
form a nursery for future transplantation; and he
drill of red clover between the rows for soiling.
proprietors are Dr Elrington, the Bishop of Ferns,
an extremely good system of husbandry. The cr
tions, gardens, cottages, implements and stock, on
demesne, evince the skill of a good *steward*,—fo
that agriculture is almost the only science which th
the universality of his attainments, does not practi
stand. The town of Enniscorthy, on the river Sla
in the limits of this barony. Yet with all the wood
tations at Castleboro, New-Ross, Newtown-Barry,
and on the banks of the Slaney, the county of We
cient in timber. There are large tracts which are
thing in the form of a tree, on the coast from the
south-west winds, and in the interior from the apa
gence of the proprietors.

On the whole, it presents what a Canadian settle
with delight as a "pretty considerable clearing."
sea-coast, exposed to the south-west, the Pineaste
Poplar, Alder, and Wych Elm, would thrive, and
pendently of ornament, the substantial advantage
and where there is security, as at Courtown, from t
influence of the prevailing blast, the very finest tim
raised. On the demesne just now referred to, tre
size are to be seen in every variety. Oh for some c
spirit of planting!

The town of Wexford, which contains 10,670 in
a thriving port, despite of a bad entrance to its
narrowness and dirtiness of its principal street, and
promenading of pigs, which, finding every convenie
fort in the streets and lanes, and being under the
a very tender-hearted magistracy, unwilling to c
avail themselves of their privileges to an exte
Englishman would think rather inconvenient. Its
siderable, the facilities of intercourse with Liverp
British Channel having given it a powerful imp

butter, coal, and cattle, are exported in considerable quantities; and the accumulating wealth of its merchants is perceptible in the increasing erection of stores, embankments from the sea, elongation and embellishment of the quay, and the building of villas in the environs. The number of shipping in the hands of a few merchants is very considerable, and two steamers ply weekly between Wexford and Liverpool.

The soil of the county of Wexford is not good; a very large portion of it, especially in the baronies of Bantry and Scarawalsh, being siliceous; other portions are clay soils of a cold nature, with an aluminous substratum, difficult to till in wet seasons, and unproductive in very dry ones. Shelburne has a considerable stratum of clayey soil, but not so heavy and tenacious as what is found in many parts of England: it is, however, cold and naturally unproductive, probably the worst in the county. Sea sand, however, is available as a manure; and, what is infinitely better, limestone from Hook-point and Slade-bay, within its own boundaries, can be easily procured by the farmer. There are a few spots of rich loam, as at Richfield, and a small part of Bannow, in the barony of Bargy, and some alluvial land, but in general the soil is very light, and without the substrata of limestone and limestone gravel so frequent in the midland districts of Ireland. Marl, however, is found in several places to counteract the defective quality, and this valuable manure, though extremely expensive in its first application, will cause the very lightest soil to produce good crops of wheat, inferior perhaps in the *quality*, though not in the *quantity*, of the grain. Where marl is not to be had within a sufficiently convenient distance, sea-weed and sea-sand or lime (the latter only in a few districts), are available to the agriculturist. The Norfolk system would be especially beneficial to this county, where consolidation and enrichment of soil are generally wanted. As far as industry and intelligence can overcome natural sterility, they are exercised. In the adoption of drill husbandry applied to potatoes (and to these alone), the Wexfordians are all practised; the lazy bed is never seen, except for a small portion of very early potatoes, or on wet lands where the furrows are required as drains. Turnips and mangel wurzel, with all the

inducements held out by the Agricultural Societies, are not grown, except by some of the gentlemen farmers in small quantities, but clover and vetches are to be seen with most of the farmers; the former crop, however, is generally mismanaged, either fed off on the ground by cows, horses, asses, pigs, indiscriminately, or made into hay,—the proper object, that of creating manure, being almost invariably defeated. Within the last ten years, a great majority of the cabins, even of the poorest occupants, have been dashed, whitewashed, and supplied with windows. Previously to that period they were of a dingy brown, the original mud colour. Little gardens are also frequently seen in front of the houses, and the dunghils have been more generally removed to the rear, or to a respectful distance from the door. All this has been effected through the instrumentality of the county Agricultural Societies, acting with all the energy and freshness of youth, and the zeal of a few individuals, among whom Mr Boyse held the foremost place. The lower orders of the peasantry, however poor, are seldom or never seen without shoes and stockings; the labourers are well clad; employment for men is usually abundant, though in the remote rural districts, where there are none but the poorest class of farmers to afford employment, the situation of *cottiers* is very miserable,—wages 4d. or 5d. a-day for men, with two meals; and as a set-off against this, there is often a charge of L. 4 yearly rent, for a cabin and patch of miserable potato ground unmanured; and there is little or no employment for women or children in either town or country:—hence an especial cause of misery. Where the fecundity of the lower classes is notorious, where (perhaps happily) no manufactures exist, and where, of course, the women have little employment except in the domestic occupations of breeding and nursing children, assisting in taking out and planting potatoes in the spring and winter, boiling the pot-ato pot (we assume that fuel is at their service), washing the rags of the household, and *occasionally* sweeping the cabin floor,—scenes of real comfort are not to be expected.

D.

ON THE DESTRUCTION OF SEED-CORN.

THERE is a probable destruction of every kind of corn, after it is sown, for which it is difficult to account. The quantity usually sown broadcast on the imperial acre in this country, is 3 bushels of wheat, 5 of barley, and 6 of oats. It has been ascertained that 3 bushels of wheat, weighing 61½ lb. per bushel, contain 2,685,912 grains; 5 bushels of barley, weighing 53¼ lb. per bushel, 3,135,360 grains; 6 bushels of potato-oats, weighing 43½ lb. per bushel, 4,434,912 grains; and the same quantity of common oats, weighing 42 lb. per bushel, 4,241,664 grains. The highest rate of produce in this country of these three kinds of corn is, in the Carse of Gowrie which contains the finest quality of wheat land, about 52 bushels per imperial acre; in Forfarshire, which is perhaps the best county in Scotland for barley of uniformly fine quality, 60 bushels of barley per acre have been reaped; and in Strathmore, a fine district for oats, 72 bushels per acre of potato-oats have been reaped.

Now, if every grain of seed sown germinated and produced a stem bearing the average number of grains in each ear, the produce would be as many times the seed sown as there was number of grains in the ear. On examining a prolific crop of corn, we will find ears of wheat containing from 61 to 24 grains each, the average may be stated at 44 grains; the grains in an ear of barley range from 21 to 32, the average may be 28; and of potato-oats the diversity is as great as from 182 to 20 grains in each head, the average being about 64. Computing what ought to be the produce by this supposition, in conjunction with the facts above stated, it should be of wheat, 44 times the seed sown, or 132 bushels per acre; of barley, 28 times, or 140 bushels; and of potato-oats, 64 times, or 384 bushels. But we have seen that the greatest actual produce in the richest districts of the country is, of wheat, 17 times, and of barley and oats, only 12 times, the seed sown, which fall very far short of what the produce should be as indicated by the number of grains in the ear.

There is, moreover, a property connected with the growth

corn which affects the question of produce very materially. All corns produce more straws than one from one root. They do not so invariably; but the instances of a single straw from one root is rare in comparison with a number. Single straws are more rare in wheat and in barley than in oats. As many as five stems of wheat and barley may be seen from one root; two, three, and four, more frequently, and three most frequently. Many favourable circumstances must co-exist to determine the number of straws which will be developed from one root. Rich soil, either naturally so, or made so by manure and judicious culture, will produce more straws from the same number of roots than poor. A fine season has a similar effect, in this respect, to a rich soil. Early sowing will, in general, also produce a similar effect. For example, in regard to wheat, a rich and suitable soil will cause it to "tiller or stool,"—the technical terms in use to express a multiplication of straws from the same root; while a poor loose soil will scarcely be able to produce one straw from every seed that germinates. A fine season, particularly a fine spring, always causes wheat to tiller boldly; and early sown wheat in autumn will tiller and cover the ground before the approach of winter. There is a variety of wheat cultivated in the Borders of Scotland, which possesses the property of tillering in the autumn in a remarkable degree. It originally came from Danzig, and is called Danzig Creeping-wheat.

Taking, therefore, in the case of a prolific crop, three straws of wheat and barley, and two of oats, as an average number from one root, and supposing, as we formerly did, that every seed sown produces a root, the produce of wheat ought to be 132, instead of 17 times; of barley 84, instead of 12 times; and of oats 128, instead of 12 times the seed sown. Or, to place the same result in another point of view: According to the number of grains contained in the quantity of corn sown on an acre, it appears that a square foot of land receives of wheat 61, barley 72, potato-oats 97, and common oats 101 grains. By tillering, the 61 grains of wheat should produce 183 straws; the 72 of barley, 216 straws; and the 101 of oats, 202 straws, on a square foot of land; whereas the number of straws, with the tillering of the roots, does not really exceed one-third of those

numbers on that space of ground. The inevitable conclusion is, that only one-third of the seed-corn sown on the best lands grows, the other two-thirds are somehow destroyed. This conclusion is startling, and may appear incredible to those who pay little attention to these matters: the facts which prove it are accessible to all. But if this proportion of the seed-corn is destroyed in the best soils, a still greater destruction probably happens in the average quality of soil in the country.

The average produce of the average quality of soil is only seven times the quantity of seed sown. The quantity of seed sown per acre has hitherto evidently been ascertained by practice alone. The seed has been sown up to the quantity which produced a full crop, and then that quantity had been fixed upon as requisite for the crop; but now we see that one-third of that quantity is sufficient for the crop. Ought we then to sow only the third? Prudence would decide in the negative, till it is ascertained how the loss of the two-thirds arises. That loss in the mean time is of great magnitude. The number of cultivated acres in Great Britain and Ireland amounts to 47,000,000; 30,000,000 of which are under the plough. Two-fifths of the latter, or 12,000,000 acres, are annually under the cereal crops. The average allowance of seed for the three kinds of corn may be stated at $4\frac{2}{3}$ bushels per acre. The quantity of seed annually sown thus amounts to 7,000,000 quarters. If two-thirds of this quantity are rendered unproductive by some agency which has hitherto been uncontrolled, then 4,666,666 quarters of corn are annually wasted! The quantity thus lamentably wasted would support more than 1,000,000 of human beings.

It becomes, then, a question of the utmost importance to inquire into the causes of this great destruction of the staff of life. Some of the causes are obvious enough, but they are not sufficient to account for the magnitude of the loss; and other causes being occult, it is perhaps impossible to ascertain which of them, if any, is in the power of man to remove. Among the most obvious of the causes of the destruction of seed-corn is the consumption by birds, which are always ready to follow the sower and help themselves before the arrival of the harrows. The seed being thrown, in sowing broadcast, on the surface of the ground,

the harrows cannot cover the whole perfectly. Some will remain on or near the surface, and being soiled with earth by the action of the harrows, they are not easily discerned, but the first rain which falls afterwards exposes them to the birds. Too much harrowing on soft land brings much of the seed to the surface, which had before been sufficiently covered. Much seed is probably destroyed by rain. It is an ascertained fact that potato-oats will burst in the ground if much rain falls immediately after they are sown. Many seeds perish by water standing in the furrows of the ridges, and in slight hollows of fields, through which it is seldom thought necessary to make water courses. A considerable quantity is tramped down into the earth by the horses' feet, some of which is placed beyond the influence of the air, and others perish in the water which collects in the horse foot-marks during the first fal of rain after sowing. The adhesive quality of clay soils m y also exclude the air from some, and the looseness of sandy soils may expose others to the injurious effects of heat or frost. All these are obvious causes of destruction to seed-corn; but though they were combined, they could not account for the destruction of 40 grains of wheat, for instance, out of the 61 which are sown on a square foot of land. The less obvious but probable causes of destruction is by vermin, such as the various kinds of mice which burrow in the fields, and the innumerable hosts of insects which inhabit the soil. Many insects which live in t e soil are not graminivorous, but they may render corn unfit for vegetation, though they may not consume it as food. Whether the combined efforts of these creatures are sufficient to account for the large proportion of the seed-corn which is destroyed, we cannot affirm. The subject, however, is of sufficient importance to attract the attention of naturalists to the predaceous habits of those animated beings which inhabit the soil of cultivated fields. May not electricity paralyze the vitality of seed-corn? May not galvanism, arising from the act on of dissolved acid salts in rain water on the metallic ingredients of the soil, produce the same injury?

But are we sure that the seed, when sown, possessed its vitality? May not the usage which corn undergoes before it is ly to be sown deprive it of vitality? The vitality of seeds

depends on the qualities contained in them: some kinds requiring to be sown immediately after they become ripe, others retaining their vitality for many years. All kinds of corn retain their vitality for a considerable time. It is not, therefore, probable that the seed-corn of the age it is generally sown has lost its vitality, as farmers always prefer new to old seed. It is scarcely possible to obtain new wheat for the autumnal sowing; but the old wheat never exceeds a year old, and it is kept in the straw on purpose till a short time before it is sown. Corn kept long in the granary germinates weakly, and therefore seed-corn is carefully kept in the stack till it is required. Barley and oats never exceed an age of eight months before they are sown. Still a portion of the seed may be deprived of vitality. It is not improbable that the thrashing of corn, and particularly by the mill, may deprive it of life, especially that portion of it which receives the immediate blow of the scutchers. Here is an illustration which may indirectly lead us to infer that a portion of even new corn just thrashed may lose its vitality:—

Some horses swallow their corn without mastication, particularly those which have little time to eat, and are much disturbed in the stable. All the mastication which they give is not sufficient to bruise the corn; at all events, the greater proportion of it is swallowed whole. That which retains its vitality escapes the action of the stomach, and passes through the animal uninjured, the rest is consumed. With such horses a larger proportion of new corn will pass through them uninjured than of old, which shews that the older corn had lost its vitality; and even the largest proportion of new corn is consumed, which shews that it also had lost its vitality, and would have been thrown away had it been sown. Did the thrashing process deprive it of life? This is, we confess, an unsatisfactory mode of reasoning; but any hint is valuable which will make us guarded in our practice, till a more certain method is discovered of ascertaining the existence of the vital principle in corn. It would be a curious experiment, and would lead to important results, to ascertain what degree of violence the different kinds of corn can bear, and retain their vitality. Could it be proved that the force of the thrashing-mill deprives any portion of corn of life, it

would be advisable to adopt some other method of thrashing corn intended for seed. The flail has probably a similar effect with the mill, though of less extent. It would be desirable to have it proved experimentally what is the lowest velocity of a thrashing-mill which will destroy the vitality of corn. A smaller velocity could then be used for thrashing seed corn, and a smaller velocity would be sufficient for that purpose, as the best corn would leave the husk most freely. The straw could be thrashed over again at a higher velocity to obtain the remainder of the crop, which is applied to edible purposes.

Means to avoid the destruction of seed corn are not in our own power. We cannot avert the rain which may fall in torrents on the finished operations of the field, or counteract the scorching effects of an unseasonable sun, after we have scattered with unsparing hand the seeds of future plenty. Nor can we wage a successful war of extermination against the myriads of living creatures who fulfil their destiny in the bosom of the earth, and whose very existence would probably have been unknown to us, had not our self-interest sharpened our faculties to discover the causes of the failure of our crops. Did we not scatter their food when we only meant to increase our own, they probably had not been there to annoy us. It is to be feared that whatever destruction may accrue to seed-corn from natural causes, they are beyond the power of man to prevent. There is one thing which is in our own power to avoid, that of sowing corn too ripe, because if it germinates at all, it germinates feebly. What is intended for seed-corn should be reaped before the uppermost grains are fully ripe. We have elsewhere in this Number enforced the necessity of reaping corn generally before it is fully ripe.

Could a change of practice ensure safety in any degree to the seed-corn, it ought to be adopted. It has been stated by writers, though not in relation to the present question, that much of the seed-corn is buried too deep in the soil; and to remedy this evil, it is recommended to sow the seed *after* the land is harrowed, and not before, as is the present practice. There is no doubt that oats are often buried between the open furrow slices of ploughed lea on strong land; and on such land the harrow ought always to precede the sowing, and every judicious farmer will follow this

practice. But it is questionable whether wheat and barley seed can be buried too deep on the ordinarily formed seed-furrows. It is asserted that an inch of earth is sufficient covering for corn. By the time the edges of the seed furrow are brought to a level with the harrows, we question that the covering is more than an inch on the largest proportion of the seed. The teeth of the harrows, it is true, are much longer than an inch, but the seed cannot find its way to the depth which is stirred with the harrow, the object of deep harrowing being to supply the seed with an ample bed of loose soil, an essential requisite for a favourable germination. There is one consideration in regard to this particular part of our subject which deserves attention; that teeth of harrows are made of the same length for all sorts of soils. It is evident they should be lengthened in proportion to the work they have to perform. Strong clay land will require longer teeth to pulverise it than a free hazel loam. Slight harrowing in all cases on free soils is a commendable practice. The results of experiments tried with harrows furnished with different lengths of teeth, on the same soil, would be interesting. But if it is feared that much of the seed is buried too deep for germination in the broadcast method of sowing, the obvious remedy is first to harrow the soil, and then sow the corn to a given depth with a drill.

The physical power of the soil, under the most favourable circumstances, is limited as to the growth of corn, in whatever quantities we may choose to sow the seed. If it is sown too thick, the crop will consist of a thick covering of short fine straw without any corn, like the tufts of straw which grow from the negligent spillings of seed-corn from the sacks. If seed is sown too thin, the ground is partially filled up with the tillering of the plants. We remember a remarkable instance of this, when about two-thirds of a promising crop of potato oats were destroyed by the grub. Rolling in the night with a very heavy roller was tried on one part of the field, and the other part was left untouched. But both parts were affected alike with the disease. The weather was exceedingly dry, with easterly winds prevailing during the ravages of the grub. At length rain fell, and genial weather ensued. The oats stooled out amazingly; so many as four-

teen stems were counted from one root; some of the heads contained upwards of five hundred grains, and some of the straws were nearly as thick as the little finger. The strength of the straw made the reaping of it a difficult task. The crop yielded, with all the unfavourable appearance in which it was left by the grub, sixty bushels per imperial acre of very fine corn. The soil was a deep hazel loam on a gravelly bottom, being land of first-rate quality. In sowing, the powers of the soil are unattended to, for the seed is sown in the same quantity on all classes of soils. But this practice does not display so much thoughtlessness as may at first appear, for the nature of the season excites or depresses the energy of the soil; and should the supply of seed be lessened in proportion to the powerful excitement of a fine season, we would blame ourselves, in a season which might turn out a bad one, for the deficiency of the crop, from the deficiency of seed, though it is probable that an augmentation of seed would produce no sensible difference on the crop, as the plants would stool out to fill the ground. The truth is, we consciously sow the land with more seed than it in general requires, but knowing with certainty that bad weather somehow destroys a portion of the seed, we in practice anticipate the worst consequences. Still we certainly err in giving all sorts of land, good, bad, and indifferent, the same quantity of seed. Experiments instituted and conducted with care for a series of years, on the quantity of corn which is required to sow various kinds of land, in different situations, would doubtless present most important results. But to render these experiments as conclusive as they should be, the land ought previously to be thoroughly drained, in good heart, and under judicious treatment. With these means and appliances to the land, and a few authenticated experiments of the quantity of seed requisite for sowing the various qualities of land, we have no doubt it would be proved that much less seed would be sufficient to produce even better crops than we sow; and though natural causes will always exist to check our power of enjoying a prolific crop every year, a considerable annual gain would annually accrue in seed-corn.

ON THE RESTING OF LIGHT SOILS, AND CONSOLIDATING THEM WITH THE PRESSER.

(To the Editor of the Quarterly Journal of Agriculture.)

THE attention of Scots agriculturists has been strongly drawn to the evident signs of exhaustion, which almost the whole of the lighter soils in the country has of late years exhibited. The wheat has been a failure ever since 1826; the crop has been weak, ill ripened, and in many cases blighted, even in places where blight was never before known, and insects, the origin of which appears to defy the researches of the most experienced naturalists, have destroyed the grain, notwithstanding all the efforts of the most skilful farmers. The falling off in the weight of green crops, potatoes and turnips, as well as the artificial grasses, is not less remarkable. In our fathers' days, *three* cuttings of clover were not uncommon during the first summer after laying down the land to grass; but now we rarely see a good *second* cutting.

These are matters of great importance both to landlords and tenants, and to the country at large. They are now exciting great attention among practical men; but although I have heard many ingenious theories and schemes for remedying the evil, proposed and discussed among men possessed of scientific as well as practical experience; yet, after all that I have heard, the conclusion left on my mind comes shortly to this; namely, that those lighter soils which in former times never missed either a green or a corn crop when properly prepared, have lost their productiveness solely through the too frequent use of tillage, whereby such soils have become so much pulverized that they are in a soft, and as it were a *puffed up* state, quite unfit for carrying the frequently repeated crops which a modern rotation prescribes; and such being the cause of the evil, the remedy lies in *resting*, and thereby restoring to the soil, its wonted strength and consistence.

What I recommend then is, to throw a large proportion of every farm into grass to lie as circumstances may suggest for a period of years *not less than five*, before it be again submitted

to another rotation of crops. This mode of restoring the soil may appear to many farmers who have hitherto trusted chiefly to grain for the payment of rents and expenses, as a plan to which they cannot resort, unless their landlords relieve them, during the regenerating process, of part of their rents; and no doubt in many cases this may be absolutely necessary, and certainly when the tenant cannot do his part without such relief, it will be the wisest policy in the landlord to give him the relief he requires. But, in other cases, where the farmer is in circumstances to bear a little present sacrifice, he should look forward to the future in the certainty of reaping great crops when the time of breaking up arrives for his recompence: he may throw his whole farm into grass, and continue to pay his full rent, and yet not be a loser. This fact has been ascertained by positive experience, that for years past by keeping a well regulated breeding stock of cattle and sheep, chiefly the latter, *more money* may be drawn from an acre of light land in *beef and mutton*, than by any rotation of *corn* crops. Of course, the circumstances of each case must dictate to the farmer the mode in which he ought to set about the laying out of his farm, and the proportions to be put into permanent grass annually; but I will state what I am doing in my own case.

I am now laying to rest a farm of 500 acres, which has for the last twenty-five years been under a regular rotation of five shifts, and it is my intention to leave it in grass for five years, taking care that each division, as it is sown out, shall be in the highest condition into which I can afford to put it, for it is well known that a light soil laid out to grass in poor condition will rather *deteriorate than improve.* Having a breeding flock of sheep on an adjoining farm, I propose extending this profitable stock to such a number as will enable me to pasture all my permanent grass, *for the first year at least*, with sheep; afterwards, it will be matter of calculation whether I shall continue to use the whole of my grass or let a part, so as to lessen the risk of stocking the whole. This process of laying out my farm will, of course, require five years. I will gradually be reducing my working expenditure until the last year of the five, when I will again have to muster my working strength; and that I expect to be well enabled to do by a sale on the ground of the corn-

crop on the last sown out division,—the manure which that crop shou d produce not being wanted the following season.*

I may here remark, that great care should be taken to select the most approved grasses suited to the various soils, and not to be sparing in the quantity of seeds. I would also strongly recommend the frequent use of a heavy roller in spring and autumn, giving, as often as circumstances may require, a light top-dressing of any compost (or even pulverized soil of a different quality from the field on which it is laid) previous to the spring rolling. This will be found to invigorate and thicken the grass in an extraordinary degree.

After this process of resting the soil is completed, I anticipate a full reward for all my *labour and patience*, by seeing the land again in a firm and consolidated state, quite fit to produce the alternate crops we were accustomed to thirty years ago; and, I trust, I shall be warranted in breaking up my lea with a crop of wheat, or at any rate with barley.

I propose ploughing the lea for wheat or barley, not in the old way,—of giving two furrows, and harrowing till the soil is sufficiently reduced for these crops,—but by one seed-furrow with the plough, followed by that invaluable implement on light soils—the *presser*, an instrument not so well known in Scotland as it ought to be. I subjoin a drawing for the information of any of my brother farmers who may wish to try the presser. From its simplicity and low price (varying from L. 5 to L. 7, according to the weight required) it is within the power of all to purchase and work it.

A very striking instance of the utility of this machine was exhibited on a field belonging to my friend Captain Barclay Allardice of Ury, who last season broke up a piece of grass-land near his mansion-house, supposed to have lain out about a hundred years. It was on a strong soil, and required four horses to

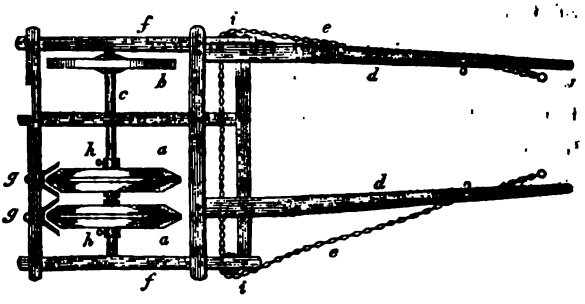
* We would here suggest to our friend, our present correspondent, whose opinion of the deterioration of light lands being caused by too frequent ploughing is correct—that instead of raising the means of working the farm when the grass was broken up, by selling the straw of any portion of the corn-crop, he should rather lay by annually for that purpose a portion of the *money* which was drawn from the land in the shape of *beef and mutton*. It grieves us to the heart to see a farm robbed of its straw, under any pretence but that of vicinity to a large town, from which large supplies of extraneous manure may be obtained in exchange.—EDITOR.

work the plough, which was followed by the presser, leaving the work in such a finished state, that although Captain Barclay's intention was to sow the field with oats after the preparation of a winter's exposure, he was induced to try a crop of wheat, which succeeded beyond his expectation, having reaped fully fifty bushels per English acre, while the probability is, that if the field had been sown in spring with oats, they would all have rotted.

The mode of working this implement is very simple. A presser is required for every two ploughs, the horse that draws it following the last plough of the two in the furrow, which so regulates the presser that it leaves the land exactly as if it had been gone over with a drill-sowing machine; the furrow-slices are laid flat at the bottom, and the surface left more like a field of fallow than grass land. By affixing a sowing-box to the presser, which could be very easily done, the whole process of ploughing, pressing, and sowing, could be going on at the same time, and by a double turn of the harrows, the operation could be completed without the usual risks of a change of weather, to which in this variable climate we are liable in every sowing season.

I have used the presser for two seasons, and can with confidence recommend it on all light soils, with every sort of corn-crop. It is an invention which we owe to our English neighbours. It has been in use in many counties in England for several years past.

I shall now give a detailed description of the presser, hoping that the few hints which I have given may be useful to farmers of light soils.



The scale of this figure is a quarter of an inch to the foot.

In the figure, *a a* are the pressers, made of cast-iron, and weighing 2½ cwt. each. They are made either in the form of a wheel or of two cups, fastened at the edge; they are 2 feet 9 inches in diameter; they are fastened on long slip-boxes, which slide upon the axle *c*, and secured by pinching-screws *h h* at the width to suit the width of the furrows to be compressed. *b* is a cast-iron wheel, which rolls on the land-side or sward, and carries the frame-work. This wheel and the two pressers are hung on the axle *c*, which runs in plumber-blocks fastened to the under side of the frame-ends *f f*, which are made of stout ash, and bent so as to suit the height of the axle *c* and the draft of the shafts *d d*, between which the horse is yoked. *e e* are chains, which pass over the pulleys *i i*, and are fastened to the draught-hooks of the collar of the horse, to equalize the draught of the machine. *g g* are two cleaners, made forked, and fastened with pinching screws on the hindmost rail of the frame, and are made to shift, to suit the width of the presser; they are intended to scrape off any earth that may adhere to the pressers during their action. H. W.

ON THE DECAY OF THE HEART-WOOD OF THE LARCH.

(To the Editor of the Quarterly Journal of Agriculture.)

Two months ago, I received a letter from an intelligent gentleman who has devoted much of his time to the study and practice of arboriculture, in which he directed my attention to a remarkable decay of the heart-wood of the larch,—a subject which had much interested that truly patriotic nobleman, the Duke of Portland. I was at the same time favoured with a copy of the Duke's letter upon the subject; and such I conceived was the importance of the observations contained in it, that I felt it to be my duty, not only to consider seriously what might be the cause of the disease alluded to, but to address myself to the Noble Duke himself, in order to learn the facts; and to my respected correspondent Mr Knight, the President of the Horticultural Society of London, in order to obtain his valuable opinion of the case. I regret to state, that the result of our correspondence is not so satisfactory as could be desired on so

important a subject; so I earnestly invite the most serious attention of your scientific and practical readers to it.

The disease of the larch mentioned in the Duke of Portland's first letter, is familiarly known to many planters, though, perhaps, not generally. I shall describe it in his Grace's own words:

"It has been found in many soils, both *wet* and *dry*, *to the latter I speak most particularly*, that the larch, when between thirty and forty years old, decays in the heart. My plantations and those of my father have hardly suffered at all yet; while others in my neighbourhood have suffered so much as to be ruined by this distemper. When I use this word, I must guard against your supposing it to be the effect of that disease *like mildew*, to which the larches, since 1802, have been subject; for though that disease sometimes, and indeed often, kills them, in *low, damp situations*, yet, generally speaking, I know of no instances sufficiently numerous to warrant me in supposing that it has produced the effect which is the subject of this letter." Such is the account which the Duke of Portland gives of the disease in the heart-wood of the larch in many plantations of Nottinghamshire. The larch is a tree that promises to prove of the utmost importance to the British Empire: it is perhaps one of the most valuable that we possess. In proof of this, the Duke of Portland refers to the fact of the Athole frigate of 28 guns, being built wholly of the larch, and which proves the excellence of the larch-wood in ship-building; the trials of that ship, which have been most severe in all climates, being conclusive of the excellence and durability of that wood. "Where, therefore," adds the Duke of Portland, "the soil and climate suit the larch, *there cannot be a greater* national *benefit than there to plant it.*"

In our endeavours to detect the source of a disease which appears to attack forests and individual trees, under the most [illegible] and indeed opposite circumstances; we ought, I think, [illegible] our attention to what may be considered the proximate [illegible] remote cause of the malady. The proximate cause is to be sought in the physiological structure of the tree; the remote cause must be traced to the soil. In my first letter to the Duke of Portland, I slightly adverted to both these causes; and I shall now cursorily retrace what I then observed.

[illegible] trees properly so called—that is, in plants with woody

stems, there is an annual formation of two concentric layers; the one being a layer of new wood called the *alburnum*, the other a layer of new bark, called the *liber*. The previously formed layers of the wood are confined *within*, and covered by, the new woody formation; and on the other hand, the new bark is covered by the old. Thus the two annually produced sappy layers, are always in juxtaposition, while the old layers are carried farther and farther in opposite directions from each other, attaining firmness of texture, as they increase in age. These are to be considered as *general* physiological facts; though there may be particular instances which are exceptions to them. The inner layers of woody matter acquiring firmness of texture as they recede from the more recent and juicy layers, become at length the heart-wood of the tree. In this view of the vegetable progress, it is of the utmost importance to inquire into the causes which induce that change of texture which has just been described, for if these can be traced with something like accuracy, a double advantage will be gained, for not only will the vegetable structure itself be better understood; but the remedy for diseases, which in more instances than the one under enquiry, ensures the destruction of the heart-wood, may be ascertained.

This heart-wood, although removed from the direct channels of the ascent and descent of the vegetative fluids, cannot be considered as dead or inert; it continues to receive nourishment and undergoes very observable changes. But what are the vessels and organs of supply and elaboration? For the solution of this inquiry, I refer to the luminous theory of Mr Knight. The scientific world has long been in possession of his theory. I may, however, be doing the cause of science some service, by quoting passages of his own letters to me. In the one received in answer to my last communication upon the larch, he observes, —" My opinion respecting the motions of the sap in trees, is, that it is absorbed by the bark of the roots, carried up through the sap-wood, then transferred to the leaf, in which it becomes what is called the true sap, or blood of the plant, corresponding with the arterial blood of animals; that this fluid descends by the bark, by which, or rather, by its glandular lining, the matter of alburnum is deposited; and that which is not thus expended,

sinks into the alburnum or sap-wood, and there in part joins the alburnous current. I say in part, because a part is expended in giving additional solidity to the sap-wood of former years, and in converting part of that into heart-wood, and in giving increased solidity to the heart-wood previously formed. So *long as the heart-wood continues to receive new matter, I conceive it to live and no longer.*" In a former communication, Mr Knight had distinctly stated what the vessels were, which, in his opinion, conducted this elaborated sap into and through the alburnum and inner concentric layers: he observed, "that the unemployed portion of sap sinks into the alburnum through the misnamed medullary processes." These processes, which have also been termed the *divergent* rays, appear to originate in the liber, and to converge towards the medulla or pith, but do not enter into it, nor certainly proceed from it. I had long ago conjectured and said, that I considered the office of these rays or processes to be that of conveying *laterally* the prepared juices which were intended to support the previously formed layers of wood; and in my letter to the Duke of Portland I stated, that the *disease* of the larch, might arise from some cause which prevented the elaborated resinous juices of the leaves and bark, from passing in sufficient quantity, by the medullary or convergent processes, *from* the *alburnum laterally*, into the inner layers of wood. Now, if this view of the internal cause of disease be correct, to what agent or original cause shall we ascribe that paralysis, or want of due conducting power in the vessels of supply? Are we to attribute it to some natural debility in the constitution of the tree, or to some external exciting stimulant, producing morbid action in the secreting vessels, at a certain period of the tree's existence?

Most writers who have noticed the decay of larch timber are inclined to ascribe it to a specifically unnutritive—that is, an inappropriate soil. Thus, in a letter from Dunkeld, a copy of which has just been handed to me, the writer observes—"I am sorry to inform you, that in many situations, the larch is decaying here, before it arrives to a large size, and more especially in moist situations. The larch you know to be a thorough alpine tree, and therefore *dry subsoil* ought to be chosen. Drift and stone where there is barely soil sufficient for the nourishment

of any other tree, is the place suited to a larch, and where it will grow to be a giant forest-tree, and as sound and compact as box-wood." "Oak timber," Mr Knight says, "is found to decay most rapidly, generally when it has been grown in soil of small depth; and to some defect of the soil the decay of the *larch* timber must, I conceive, be attributed. A *wet soil*, by destroying all but the superficial roots, may, I think, act like a light or shallow soil. The larch shews no disposition whatever to decay, when planted in deep argillaceous loam, and I have not even seen it decay in this country, in the manner described by the Duke of Portland." A *dryness* of soil, then, however writers may differ in respect to situation and depth, appears to be insisted upon as a *sine qua non* for the healthy progress of the larch; but the Duke of Portland distinctly says, that it is in a *dry soil* particularly that he has found the tree to decay at the heart, when it had attained the age of thirty or forty years! How are these anomalies to be reconciled? I proposed to his Grace to analyze by chemical tests any small portions of the soil which he would cause to be forwarded to me, hoping that, by a bare possibility, some deleterious matter might be detected in portions of that soil in which the trees were found to decay, which did not exist in those portions of soil which carried sound timber. With that promptitude which characterizes this nobleman, his Grace honoured me with an immediate reply. The Noble Duke observed, that he could doubtless procure the specimens I requested, but that the analyses of such small portions could scarcely yield any satisfactory result, as no one could be certain that the parcels selected contained the causes of the decay of the trees. Such had been the extent of the malady upon the property of one gentleman (half his trees having exhibited symptoms of sickness), that he had determined to cut down the whole of his extensive plantations. But as these trees *had flourished* for many years, it is evident that the roots, as long as the trees flourished, had not been attacked with the disease, which in the end proved fatal to them. "I see," concludes the Noble Duke, "larches grow luxuriantly, where all the good soil has been taken away; and I also see that they are very much benefited by the good preparation and improvement of the soil previously to their being planted. I am quite at a

loss to reconcile facts apparently so discordant. I should not think that any thing but *an examination of the soil on a great scale, and in many places*, can possibly detect the causes of the mischief."

Shortly after I received this letter, I met with a passage in the Gardener's Magazine directly applicable to the subject under consideration. It is to be found in vol. vii. p. 374, of that work, and is from the pen of one of your able correspondents, Mr Archibald Gorrie, bearing date February 10. 1831. After stating that the larch has been found to decay, and also to remain unaffected by disease, in almost every species of soil and subsoil, Mr Gorrie observes: "This being the case, we are led to suppose that the rot in the larch takes its rise from something accidental, rather than from any natural property in the soil." The practice of planting larches after Scotch pines, has, he considers, led to fatal results. He "has recently discovered, in numerous instances, that, where this has taken place, *the rot uniformly commences in fearfully numerous individual instances.*" The disease takes place in seven or eight years after planting: "while plantations of the same plant, on the same estate, planted at the same period, and in every respect similarly circumstanced to the other, *with the important exception, that they did not follow the Scotch pine*, continue entirely free from the rot." More to the same effect, and bearing upon the same fact, follows; and so impressed was I by this to me new view of the exciting cause of the malady, that I copied the whole passage, and sent it immediately to the Duke of Portland. Two days afterwards, I received an answer from his Grace, wherein he shortly observes: "I am sorry to say, that the decay of the larches in Nottinghamshire *is not to be accounted for* in the manner supposed by Mr Gorrie; for *there, certainly, they had not been preceded by Scotch firs.*"

Thus, then, rests the whole case at present. We are baffled in every conjecture. We know not whether certain trees may in themselves contain the seeds of disease, the germs of future malady, which remain dormant till they are excited by some peculiar stimulus; whether that exciting cause is to be attributed to a peculiar atmospheric influence upon the leaves and points of the tree; or whether it is to be assigned to some peccant humour in the

soil, affording unwholesome food, and producing an injurious effect upon the whole system of the tree.

In this existing state of uncertainty, I may conjecture, that, as the larch may perhaps be considered a purely alpine tree (and ought to be treated as such, if it be expected to grow to a large size), its constitution may be affected in our changeable climate, and rich loamy soil, and which may engender diseases altogether unknown in the tree in its native clime. May not the decay of the heartwood be produced by a fungus which may alter the condition of the vegetable juices of the tree? The sap of the diseased tree might be subjected to the microscope, or to any other experiment which skill and science can suggest, to discover what are the peculiar concomitants of this fatal malady.

It has not been my lot to reside in a part of the country where larches are grown, and therefore an opportunity has not been afforded me of remarking the tree in its various shapes of health or decay; but the present inquiry having been urged upon me, I have taken every step within my power to excite others to prosecute the desired investigation. I have only stated those facts which have come within my own knowledge; and shall, in conclusion, add a few remarks from a letter just received, in order to evince the great value of the tree, in a national point of view. The writer is evidently a practical man, intimately acquainted, from observation, with the facts he details. We have proved, he observes, that the larch is a more *durable* wood than any other that is grown in this country, even when it is wrought and put to use the moment it is cut down. *Ten months* are found sufficient to perfect its *seasoning*; but it ought to be kept in *the shade* during that process, as, from long practical observation, it has been ascertained, that exposure to drought, for some months after it has been felled, is very injurious to it. He confirms the fact mentioned by many writers, that the larch has the property of killing every sort of coarse herbage, and of converting the most barren and elevated tracts of land into the finest pasture. The natural dimensions of the tree are very great; one recently measured near Dunkeld was, in circumference, at one foot from the ground, 18 feet, and at 70 feet from the ground, 4 feet 6 inches: its height was 100

feet, and its solid contents 350 feet *. These facts are no doubt known to many of your readers. They tend to satisfy every well-wisher of his country, that the tree is worthy of all the attention that can be bestowed upon it, in appropriate situations, in order to perfect its growth, and preserve it from untimely decay. G. I. T.

ON TUMOURS IN CATTLE. *By Mr WILLIAM DICK, Veterinary Surgeon, Edinburgh.*

ABOUT three years ago, my opinion was requested regarding a disease to which the cattle on the farm of Inver-Brora, in Sutherlandshire, were particularly subject. The following account of the disease was given by the owner Mr Hood.

"I have had the farm eleven years, during which time I have had an annual loss by this disease; but till the summer of 1828, I had not above six or eight attacked in a year. In that season I had about twenty, and in the following year thirty-six. I have often cured them by cutting out the excrescence, but that operation has become more difficult the last three years, owing to its being deeper in the neck; indeed, it is often at the very root of the tongue, and in one or two instances the tongue itself was affected. They are sometimes on other parts of the animal, viz. the flank, back, &c. but in nine cases out of ten, they are in the throat. The cattle I keep are generally purchased at 18 months old, and I dispose of them in August or September following. I have got them from all parts of the counties of Sutherland, Ross, and Caithness, and find them indiscriminately attacked with it; and when I breed any at home, they are the most unfortunate, having last year lost six out of seven. The months of May, June and July, are the fatal months, though I have sometimes had a few attacked sooner. The manner in which they were kept in the winters of 1827–8 and 1828–9, was upon straw night and morning, in a dry and well

* See an account of the larch plantations at Dunkeld, and Blair, in vol. iii. p. 165, of the new series of the Transactions of the Highland Society of Scotland.—EDITOR.

sheltered fold-yard, and for several hours in the middle of the day they were put to a field where they got as many turnips as they could eat, from the end of October till the first week in May, when they were put to grass.

"The situation of the farm is cold, and exposed to severe gales of wind from the west; but the soil is particularly dry, being a sandy loam, and producing excellent artificial grass. Last year, I bought fourteen cattle in the month of May, nine of which were seized with the distemper; indeed, I find little difference in their being wintered on this farm or otherwise. I should state, however, that these fourteen were in very poor condition when I purchased them. The cattle have at all times a full supply of water;—in winter, that of which I sent a specimen to Mr Lawson, which I believe you have seen; and in summer, the River Brora, of which all the cattle in the neighbourhood drink.

"An intelligent drover remarked to me last season, that he suspected I gave the cattle too many turnips, as small cattle did not thrive by being too much pampered. I have followed his suggestion so far as to give them less this winter, and shall wait the result. Upon the whole, I am of opinion that it is something in the grass that causes the complaint, but what that is, I can form no idea. I may add, that some of my neighbours have occasionally a beast or two affected in the same way; the Marquis of Stafford had sometimes eight or ten in a season at Dunrobin, but since 1822, it has completely disappeared from thence."

In addition to the above account by Mr Hood, the following description was given of the disease by a medical gentleman in that neighbourhood.

"In the summer of 1828, my attention was directed to a number of young cattle who were affected with *Encysted* or *Honeyed* Tumours, situated in the throat, at the superior angle of the lower jaw. When I first observed them they were superficially attached to the cellular membrane of that part, and of course were easily removed by excision, (which is the only treatment I have found of the least use,) but now they have assumed a more malignant appearance, being firmly attached to the root of the tongue and cartilages of the throat, so much so, as almost to render their removal impossible. The effects of the

tumours are an immediate falling off in condition, and great oppression of breathing, and when the disease is allowed to take its course, the cattle generally die within four or five weeks after its commencement."

Besides these, the opinion of an eminent agriculturist was sent me, who, after an attentive consideration of the case, is of opinion that the disease is caused by some insect. "My own opinion," he says, "is, that it is caused by some insect, and the only way to find a remedy is, by a most minute and careful examination of the part, to try and find out what insect it is. Of course this is to be done both by cutting out the diseased part from the beast when alive, and also examination after death. Having found out what the insect is, the cattle might be removed to high ground, lea, or an open muir, while the insect was in the winged state. The common carrion-fly, and a few others, do not continue to be injurious in the winged state longer than three or four weeks, and the cattle would only require to be that time removed from the pastures. Though I may be wrong in supposing it to arise from the bite of an insect, still it would be greatly for the good of the cattle to be shifted to high ground for some time during the heat of summer, as, on their return to lower pastures, they would find the grass fresh and free from the tainted smell which they much dislike in grass which has been trodden and breathed on by themselves. I would also strongly advise salt to be given as a thing which can do no harm; and if it be something in the blood, as it is vulgarly called, which occasions those tumours, it may be of great benefit. An ounce and a half to a beast of 35 stone Dutch per day is enough, and less, according to the size of the cattle. I think it might be useful to clip away all the hair as soon as the tumour appears, and foment three or four times a-day with very warm water, using blanketing, or some such thing, and fomenting for twenty minutes each time. I would wet the place all over with a little laudanum. Let the cattle get plenty of good water at all times, and attention should be paid to the state of their bowels."

Notwithstanding these and some other communications on the subject, I was unable to ascertain satisfactorily the cause of this destructive disease. But as it appeared to me to depend upon some local cause, and as the case was one of considerable importance, and seemed rather mysterious, I resolved to visit the

place, in order to make particular investigation, and satisfy myself upon the subject. Having arranged that Mr Hood should inform me when the disease made its appearance, and having received notice that two had become affected, I set off to Sutherlandshire in June 1832, enjoying, as far as the unfortunate circumstance of a wet day on a stage-coach would allow, the beautiful and romantic scenery with which the Highlands abound, and which is, at that season of the year, the most richly adorned. Leaving Inverness with the mail, and in passing through Ross-shire, I was kept awake by the interest which the delightful appearance that county exhibits:—the richness of the soil,—the luxuriance of the crops, and the highly cultivated state of the lands through which the road passes, almost induced me to believe that I was still in the Lothians. Nor was I less surprised to find the high state of agriculture in some parts of Sutherlandshire, and not a little astonished to see the immense efforts which were made to improve the waste lands, and the success with which those efforts had been crowned, where the improvements had been completed; but, with the means and inclinations which the late Duke of Sutherland possessed, there is no end to the improvements which may be made in the country. Leaving Golspie, where I was kindly met by Mr Hood, and passing along the road towards Brora, by the fields which are connected with Dunrobin, I still found the same healthy and luxuriant state of vegetation which had been so conspicuous in the latter part of my journey; but when I had gradually emerged from the shaded and more sheltered parts, I had then before me a country of somewhat different aspect—a pretty extensive tract of flat ground, closed to the right by the sea, to the left by hills of considerable altitude, running in a south-west direction, and before me hills extending from the north-east to the south-west,—the whole enclosing a triangular-like space, almost a dead flat. The hills in front approaching each other formed Glen Brora to the west, from which the river Brora runs into the sea at Brora. The farm of Inver-Brora stands nearly in the centre of this flat, which is perhaps not 100 feet above the level of the sea, and is thus exposed to the chilling wind from the sea on the east, and to the concentrated blasts which sweep down Glen Brora, on the west. In one part of the farm there is a bank, which, in a great measure, shelters the field next

it from the sea breezes, but at the same time it exposes it in a greater degree to the western gales, which Mr Hood informed me were extremely severe. Another field or haugh was protected from both; but from the richness of the soil, this part of the farm is kept always in tillage, and the cattle therefore derive no protection in it. There is not a belt of wood on the farm to afford protection from any wind that blows. The farmsteading, as Mr Hood states in his letter, was good and commodious, the situation dry;—the soil light and dry;—the water slightly inclined to a mossy tint, but sufficiently good;—the grasses on the farm had been examined by an excellent practical botanist, and nothing unusual or noxious was found, but still the disease continued to prevail amongst the cattle on the farm.

There were two of the cattle affected with the disease, and Mr Hood placed them entirely at my disposal. The one was immediately destroyed, for the purpose of examining into the nature of the disease, and I proceeded to attempt the removal of the tumours from the throat of the other. On dissecting the first, I found the tumours presented a somewhat malignant character, being what is usually called *medullary sarcomatous* tumours; but these I found varied in their character, and in some cases proceeded to form an abscess, which, when laid open, frequently healed up kindly, and the animal afterwards did well; while, in other cases, the tumours remained in an indolent state for a time, and then increased in size, without, however, proceeding to a free suppuration, but continued to increase, until by their bulk they interrupted inspiration, prevented deglutition, and destroyed the animal by the continued irritation they kept up. The lymphatic glands of the throat seemed to be the parts most liable to be affected; but the disease occasionally attacks other parts of the body. In some cases, these abscesses form, open, and discharge pus for a time, but gradually falling into an indolent state, the matter becomes unhealthy, and sinuses are formed which fall into a state of chronic disease; while in others the abscesses, after forming a considerable length, stop short, the matter becomes partly absorbed, and the whole assumes a chronic character, with the medullary-like appearance I have already iced.

may here remark, that there is in cattle a strong tendency is form of disease, under every circumstance in which a

part is either inflamed from internal derangement or from external injury. There is in fact, it appears, a weakness of constitution in cattle, from which their diseases have a strong tendency, either to run rapidly into putridity, or to sink into the chronic form of the disease now in question. The constitution of their blood has a tendency to lead to this supposition, for in cattle there is never to be found, so far as I have seen, that separation of the constituent parts, by which, what is termed the *buffy coat*, is made to appear. Hence, with such a constitution, cattle exposed to any cause or causes, which keep up a continued action on their system, must have a strong tendency to the kind of disease to which we allude.

In the case of Mr Hood's cattle, the cause appears to me to be the want of proper shelter; "driven by the wind, and battered by the rains," for the greater part of the year upon an open flat, without either natural or artificial shelter, that they might have recourse to when necessary, their constitution is unable to bear up against it, and this form of disease is the consequence, which, like strangles in horses, seems almost exclusively to attack young animals. Indeed, it appears to me to be an analogous disease, for at Inver-Brora it had long been remarked that milch cows were not liable to the disease. To this general remark, however, there are some exceptions; because in the part of the country around Edinburgh it has occasionally made its appearance among milch cows as well as young stock; but of course the proportion of young to old cattle in this part of the country is very small, when compared to what it must be in a grazing district. In alluding to this view of the subject, it is necessary to remark, that although the disease has not to my knowledge shown itself to such an extent on any other individual farm, I was at once convinced when I saw the cases at Inver-Brora, that it was not so rare a disease as I at first imagined, and I found on inquiry that it had been observed in some parts of that neighbourhood. At Dunrobin it had occasionally occurred as stated in Mr Hood's letter, but had almost now disappeared. This circumstance, however, only served to confirm me in my opinion of its cause; because I saw that belts of fine thriving plantations had been gradually rising up, and now forming a complete shelter to the cattle which pasture there, more especially sheltering them from the sea breezes,

while the hills defend them from the land winds. Mr Hood found, too, that a change of situation had often an effect in checking the progress of the disease, or of effecting a cure. In some instances he drove his cattle to another farm, where, although a higher situation, there was more uneven ground, and of course more shelter. This circumstance is of itself sufficient to shew; and, from what I have before stated, it must be evident that the disease is produced by local causes, and that those are what I have alluded to. Mr Hood states, that his cattle were kept in a well sheltered straw-yard from October to May; but that they were put to the fields for several hours a-day. Now, it is probable that, from the circumstance of the straw-yard being comfortable, the cattle would be thereby rendered more susceptible of injury when turned out from it to the cold and exposed fields in which they received their turnips. That the disease arose from atmospherical causes seems also evident, from the circumstance of a disease very analogous having prevailed this summer amongst horses in several parts of the country, in which the lymphatic glands of the throat seemed to be the parts most conspicuously affected, and this disease has undoubtedly arisen from the state of the atmosphere.

The disease, when it occurs in the southern parts of Scotland, is commonly known by the term *Clyers in the throat*, and seems to be very analogous to strangles in horses. The treatment, however, is somewhat more difficult in cattle than in horses, and its effect more fatal; for, as I have already stated, there seems to be a weak or depressed state of the system connected with it, and the disease, from this cause, instead of proceeding to suppuration, and forming an abscess, which bursts and discharges itself freely, as in horses, often assumes an indolent state, and discharges but a little from different points, and afterwards forms sinuses; or the matter is partially absorbed, and a tumour is formed. I have been informed by eminent farmers, that cattle bred *in-and-in* are very subject to clyers in the throat, after they have attained their first year. These clyers affect their breathing at all times, but do not prevent their feeding till the act of deglutition is rendered painful by the enlargement of the tumour. Young queys are most susceptible of this dis-

e, which, of course, renders them unfit to be kept for breed-

. This fact still corroborates my view of the disease, for it

is a well known circumstance, that breeding cattle in-and-in renders their constitution very delicate; and were the facts correctly ascertained previous to the symptoms of that disease appearing, I have no doubt they will be found to have arisen from injurious exposure to the weather.

From this view of the disease, it becomes necessary to attempt the cure, by confining the animal in a comfortable byre or shade, and increasing the strength of the system by a nutritious diet, combined with tonic medicines, such as the sulphate of iron, in doses of 2 drachms to a middle-sized two or three year-old, once a day, in a little gruel, or 5 grains of iodine in gruel night and morning. The tumour should be laid open if matter is to be felt, but if not, a blister should be well rubbed into the surface of the swelling, and repeated until there is either absorption of the tumour, or the formation of an abscess. Should this plan not answer in raising an energetic action in the tumour, iodine in the form of ointment, 2 drachms to 4 ounces of lard, should be well rubbed into the tumour every day until absorption of the tumour takes place. If it is still found that the tumour resists these remedies, it should be freely cut into with a lancet (as there is always some matter in the tumour) and a little tow put into the wound, twice a-day smeared with blistering ointment, or dipped in a strong solution of sulphate of copper.

In the early stages of the disease in those animals which seem to have a more robust constitution than is generally the case in those attacked with the disease, it may be worth while to try what can be done to stop the progress of inflammatory action by bleeding and purging; but it will in general, I think, be found, that this plan is not to be put in competition with the one I have already recommended.

Where the disease seems to rage to the extent it has done in Inver-Brora, some means of *preventing* the disease is preferable to curing it; and as I think I have shown that it depends so much on the want of proper shelter, it will become worth the consideration of the proprietor or farmer in such situations, where no other plan to insure the same success can be attempted, to try the slow but sure remedy of belts of planting, so disposed as to protect both the cattle and the crops, and thereby improve the farm for every kind of agriculture.

ON THE APPLICATION OF VEGETABLE PHYSIOLOGY TO AGRICULTURE.

Illustrations of Vegetable Physiology, practically applied to the Cultivation of the Garden, the Field, and the Forest; consisting of Original Observations, collected during an experience of [illegible] years. By JAMES MAIN, A. L. S. 12mo. London, 1833.

It is true, as the author of this little volume remarks, that, although vegetable physiology has engaged the attention of some of the most distinguished naturalists in Europe, it is still but imperfectly understood, and that it has too frequently been explained by references to animal anatomy, to which in fact it has little reference. It has also been in some measure obscured by the terms employed in its illustration, and it has been the author's object to divest it as much as possible of some of its superfluous disguise.

"Vegetables," he says, "are organized beings, endowed with motability, which is called life, but without sensation, unless their powers of contractility and irritability may be so deemed." Abstract definitions tend more to obscure than to illuminate. We cannot perceive much simplification in this definition of plants. It is not at all intelligible to us, that motability constitutes life; nor do we understand precisely what the term is considered as signifying. Surely the particles of a gas have motability, and those of a metal have expansibility; but gases and metals are not plants. Again, what follows is obviously not distinctive; for animals as well as plants are "formed of elements fitted for expansion,—recipients of nutrition,—laboratories of divers qualities,—capable of reproduction,—and at last dissolvable into their first principles." But let this pass, with the sage remark, that the definition and distinction of animal and vegetable nature have puzzled the wisest heads.

The organic tissue of plants is perspicuously described, with reference to the leading idea that the expansion of the cellules constitutes the development of the vegetable. This idea, however, is manifestly erroneous; for if a plant, increased in size, in consequence of the enlargement of its cellules, a tree four feet

diameter must have cellules proportionally larger than one r inches, which, however, is not the case. The distribution vegetables into divisions, classes, orders, genera, &c. is well ex- ined, and the peculiar modifications of structure observed in dif- ent tribes, are also accurately described. In the interesting sec- n on the application of physiological knowledge to the various ctices of the cultivator, the author is not only succinct and spicuous, but treats his subject in a manner calculated to be ductive of much benefit to the cultivator. Thus, in the pter on pruning, he describes the various effects produced the various modes of removing branches or twigs, and gives ticular directions for rearing all kinds of trees for timber, it, or ornament. Without succeeding in determining satis- torily the nature of the food of plants, Mr Main offers ny judicious remarks on the application of manure, and the nges which may be effected on lands of different qualities. The best soils," he says, "are composed of nearly equal tions of sand and clay, together with the detritus of calca- us rocks, and decayed vegetable or alluvial matter, gene- y called loam. Its consistence is friable, readily admitting and rain, and as readily discharging all excess of the latter, nly retaining, or imbibing from the air, as much as is suit- e to vegetation; and neither liable to be parched in summer drenched with surface-water in winter. If a cultivator be ated on a soil which is different from the above, his main leavour is to improve, by bringing his land as near to this ndard as he has means or opportunity to accomplish. Cover- his sand with clay or marl, or his clay with sand, is the most ect, though a most expensive mode, and which but few can lertake except on a small scale; yet when these two descrip- ns of soil lie contiguous, the union may be performed gra- lly, and a garden or a farm may be completed in no great gth of time. Such improvement of the staple of land, with iodical dressings of good manure, would amend and render apable of bearing any kind of crop; and, moreover, facilitate operations necessary to be performed upon it ever after."

The chapter on the diseases of vegetables gives a clear ac- nt of their nature; that on insects destructive to plants is ler, and highly interesting. The various modes employed in

felling and grubbing trees are next discussed, and some remarks on the longevity of trees conclude the work.

The principal feature of the book, in the author's judgment, are descriptions of the organs of plants; the proper distinctions of stems and roots, which, he says, have not before been defined with sufficient accuracy; the constitutional development of bulbs and tubers; the progressive growth of new wood and bark, and other processes of vegetation. In all these departments, and especially in the descriptions of stems and roots, we cannot perceive any thing decidedly new, at least the distinctions between these organs were familiar to us long ago. Contrary to Mr Main, we consider the *practical* part of his book by far the most important.

It is certain that science properly so called, has hitherto kept far in the rear of agriculture, and that vegetable anatomy and physiology have, in scarcely any case, been productive of decided improvement in that art, the cultivation of which have been guided successfully by experience and observation, without being sensible of any injury resulting from their empiricism. But, although this has been the case hitherto, it does not follow that in cases where it may be necessary to urge the soil to produce a much more abundant and more rapid succession of vegetable produce, the aids of physiological and chemical science may not be eminently useful in directing the cultivator. On the contrary, we think science will, and indeed has, already sanctioned many of the operations of husbandry, and were scientific men better acquainted with that art, most of its operations could probably be scientifically explained. Mr Main's work is the first which we have seen that professes to make practical application of vegetable physiology; and as it is undoubtedly desirable that all practitioners, or at least that all principals in agricultural and horticultural operations, should be acquainted with the structure and functions of vegetables, we strongly recommend to them the perusal of this little work, as capable of affording the requisite knowledge. Our strictures on it are confined to those subjects of the work on which difference of opinion has hitherto existed.

ON THE AGRICULTURE OF THE TROPICS.

The Tropical Agriculturist: a Practical Treatise on the Cultivation and Management of various productions suited to Tropical Climates. By GEORGE RICHARDSON PORTER, Author of "The Nature and Properties of the Sugar-Cane," &c. 8vo. London, 1833.

THE agriculture of the Tropics presents few points of resemblance to that of the Temperate regions. In the latter portion of the globe, the agriculturist is obliged to employ much skill and unwearied industry, both acquired by long experience, to reap at the best a scanty crop. His skill is required to arrange the operations of the field, according to the various climates which are presented to him in the course of a year. One advantage, however, he possesses with these varied climates,—they succeed each other in regular succession, so that his operations assume a similar regularity. His industry is required to preserve from destruction, and cherish with care and nourishment, the fruits of his toil; and as the destructive elements of air and water are irregular and uncertain in their effects on his crops, his industry is necessarily unceasing for their preservation. In the tropics, the amazing luxuriance of vegetation implies a rich soil and genial climate, in every situation and season. There the agriculturist may have little anxiety for the safety of one crop, for nature bountifully supplies him annually with three. His industry is never called forth, his wants and desires being satisfied with little exertion. In short, no two individuals can be placed in more opposite circumstances than the agriculturists of the tropical and temperate regions. It might, therefore, be supposed, that our agriculturists feel little interest in the agricultural operations of the tropics. It is quite otherwise. Though deriving no lessons of utility from a relation of tropical operations, they nevertheless feel a strong desire to know the cultivation of those extraordinary productions of nature, which constitute the chief objects of luxury in their domestic economy.

In this laudable desire Mr Porter's Tropical Agriculturist

will amply gratify them. From the culture of the cotton plant, the fabrication of whose woolly fibres affords employment to many thousands of our inhabitants,—of the tobacco, whose leaves afford an exhilarating luxury to many more thousands,—and of the tea-plant, which supplies a soothing and indispensable beverage to millions,—from these to the vanilla, which is only used to heighten the flavour of other luxuries, Mr Porter has happily described every particular in the method of cultivating them. No previous author has attempted a work of this kind. Information regarding the culture and history of most tropical plants may no doubt be found scattered in many volumes of voyages and travels; but it was reserved to Mr Porter to present them before us at one view, and this task he has performed with judicious taste. Nor can we forbear noticing the beautiful woodcuts which embellish the volume.

Mr Porter is already favourably known to the world as the author of a valuable work on the sugar-cane, the most important work on colonial agriculture which ever appeared. The object of his present volume is to show the practicability of cultivating all the productions of the tropics of which he treats, and which are all objects of desire in Europe, in our West India colonies. Since the sugar of every country is allowed to meet that of the West Indies in every market in Europe, and since its price is below a remunerating standard, it becomes a question of importance whether means cannot be devised for diminishing the growth of sugar in the West Indies, so as to bring the supply within the effective demand. Mr Porter happily shows how productions which are abundantly supplied by the hand of nature in other tropical climates, may be successfully raised in our West Indian Islands. This change of the objects of cultivation would introduce a beneficial rotation of cropping, which, although not indispensable to induce a greater energy of vegetation within the tropics, as in the temperate regions, would nevertheless cause a still greater power of useful production to be called into action.

It is not our intention to follow Mr Porter for the present, as our space is limited, but we shall avail ourselves of his assistance, when we from time to time describe the useful productions of tropics.

MISCELLANEOUS NOTICES.

I. *To produce Two Crops of Kidney Potatoes on the same Ground in the same Year.*—In taking up the first crop, bury the tops in the trench by turning the earth between the rows upon them; the ground is then ready to plant again. At the end of March, plant the first crop, and the second about the middle of July.——*The First Crop.* It is well known to growers of the ash-leaved kidney, that it is difficult to prevent its exhausting itself previously to the time of planting it, and that, if seed potatoes of it are allowed to remain too long in the pit, frequently not one-third of them will grow. To prevent this, put them into the pit about Christmas, and take them out the latter end of February or beginning of March——*The Second Crop.* Those intended for the seed potatoes of the second crop, spread thinly on the floor of an outhouse, where there is a fine current of air. This treatment so much checks the growth of the sprouts, that these do not become more than one inch long, and are individually furnished with a cluster of roots. Plant the potatoes with the shoots upon them in this state; and, in planting them, guard carefully against breaking off any of the shoots. Those potatoes produced in the second crop are the fittest to procure for the next year's planting; as, when housed or pitted, they are less prone to exhaust themselves by sproutiness than are those of the first crop. During the latter part of the first crop being taken up, it would be well not to bury the unripe tops, as they are apt to produce some minute potatoes to the detriment of the second crop.—*Mr John Dawson sen. in the Gardener's Magazine.*

II. *Fecundity of the Onion.*—It was stated that a gentleman in Lancashire has raised this season (1832,) 8000 ounces of onions from 12 ounces of seed. Mr Crossley, the engineer of the Macclesfield canal, residing at Bollington, having seen this statement, was induced to weigh his crop, when he discovered, that from 2 ounces of seed, the produce was the amazing quantity of 2490 ounces or 156 pounds, being nearly double the produce of the former, in proportion to the quantity of seed sown.—*Repertory of Patent Inventions, No. 95.*

III. *Otaheitean Mode of Preparing Arrow Root.*—When a sufficient quantity of the roots of the *Tacca pinnatifida* are collected, they are taken to a running stream, or to the sea-beach, and washed; the outer skin is carefully scraped off at the same time with a shell; and those who are particular in the preparation scrape out even the eyes. The root is then reduced to a pulp, by rubbing it up and down on a kind of rasp, made after the following manner:—A piece of board about three inches wide, and twelve feet long, is procured, upon which some coarse twine, made of the fibres of the cocoa nut bark, is tightly and regularly wound, and which affords an admirable substitute for a coarse rasp. The pulp, when prepared, is first washed with salt or sea water through a sieve, made of the fibrous web which protects the young frond of the cocoa nut palm; and the starch or arrow root, being carried along with the water, is received into a wooden trough, made like the small canoes, used by the natives. The starch is allowed to settle for a few days, the water is then strained, or more properly poured off, and the sediment rewashed with fresh-water. This washing is repeated three times with spring water, after which the deposite is made into balls of seven or eight inches in diameter,

and in this state dried in the sun for twelve or twenty-four hours. The balls are then broken, and the powder spread for some days in the sun to dry, after which it is carefully wrapped in *tapa* (the native cloth), and put into baskets, and hung up in the houses.—*Mr A. Matthews, Lima, in the Gardener's Magazine.*

IV. *Saxony Wool.*—To the late King of Saxony, when Elector, is due the merit of having first brought the breed of Spanish Merino sheep into Germany, which has since transferred the valuable trade in fine wool almost wholly from the Spanish to the German soil. From the period of its first introduction until 1814, when Europe once more began to enjoy the blessings of a general peace, this wool was gradually, although slowly, spreading itself over the surface of the kingdom of Saxony; but when the continental trade was thrown quite open, by the events of the short campaign of 1815, and the minds of men were set at rest by the final catastrophe of Napoleon, the Saxon wool dealers began to open a regular trade in the article to England, and they soon discovered the real value of this new branch of German commerce. In the first year, viz.:—

In 1814, there were imported into England only .	3,593,146 lb.
... 1819, ...	4,557,938
... 1824, ...	15,432,657
... 1828, ...	23,110,882

This prodigious increase in the demand for German wool naturally excited the emulation of the States lying contiguous to Saxony; and the flock masters of that kingdom carried on, for a considerable period, a very prosperous trade in rams and ewes with the land-owners of Silesia, Bohemia, Austria, and other parts, who were desirous of changing the nature of their flocks to this more profitable breed. All the superabundance of grain, which had no external vent to carry it off, was given to the sheep, in order to accelerate their approach to the maximum degree of fineness of which their wool was susceptible; thus actually creating a profitable consumption for their corn, through the eagerness exhibited in England to obtain a superior quality of wool.

V. *Management of Bees in Cashmere.*—Every farmer in Cashmere has several bee-hives in his house, and in some houses I have counted as many as ten. A provision is made for these in building the house, by leaving appropriate cavities in the wall, and which somewhat differ in size, but agree in their general form, each being cylindrical, and extending quite through the wall. The tube thus formed is lined by a plastering of clay mortar, about an inch in thickness, and the mortar is worked up with the chaff or husk of rice, or the down of thistles, which latter is employed for clay mortar in general, being the first application of this substance to the use of man which I have yet witnessed. The dimensions of a hive are, on an average, about fourteen inches in diameter, and when closed at both ends, about twenty or twenty-two inches in length. The end of the cylinder nearest the apartment is closed by a round plaster of red pottery ware, a little convex in the middle, but with the edges made flush with the wall by a luting of clay mortar, and the other extremity is shut by a similar disk, having a circular hole about a third of an inch in diameter in the centre.—It does not appear

that there is any particular rule for the height of these hives from the ground, as they are sometimes confined to the walls of the lower basement storey, generally appropriated to cattle in the farm-houses of Cashmere; others are inserted into those of the first floor, and are frequently in both situations in the same house, as well as the walls of its outbuildings. So great difference exists betwixt the practice ordinarily pursued in Cashmere and in Europe, in respect to hiving new swarms when the honey is taken, that it deserves imitation. Although the season for taking the honey had passed when I visited Cashmere, in the beginning of November, the cottagers indulged my wish of seeing the process by which this was effected, but with little injury to the bees, and with perfect safety to the individuals concerned in its management, and which was as follows:—Having in readiness a wisp of dry straw, and a small quantity of burning charcoal in an earthen dish, the master of the house, with a few strokes of the point of the sickle, disengaged the inner plaster of the hive, bringing into view the combs suspended from the roof of the hive, and almost wholly covered with bees, none of which, however, offered to resent the aggression, or to enter the room. Having placed the straw upon the charcoal, and holding the dish close to the mouth of the hive, he blew the smoke strongly against the combs, but removed the dish the instant the straw took fire, to prevent it burning the bees, and quenched the flame before he employed it again. Almost stifled by the smoke, the bees hurried out of the outer door with such rapidity, that the hive was cleared of its inhabitants within a few minutes, when the farmer, introducing the sickle, cut down the combs nearest to him, which were secured into a dish previously slidden underneath them, and left undisturbed about one-third of the combs, which were almost close to the outer door. He then replaced the inner plaster, and brushing off hastily a few bees that clung to the combs, though apparently in a state of stupefaction, threw them out of the house. Observing many other bees lying motionless on the floor of the hive, I inquired whether they were dead or only stupified, and was answered that they would recover; preparations for continuing my journey at a very early hour on the following morning, having unluckily prevented my examining the spot where they had been thrown out, until poultry had for some time been feeding near it.—The expelled bees returned as soon as the cavity was freed from smoke, without stinging a single individual, and the whole business was completed in less than ten minutes, without, as was asserted, any perceptible loss. The honey was light-coloured, and of a taste as pure and sweet as that of Narbonne. It possessed less of the cloying quality generally attending this substance, than any other I recollect to have met with; nor could I learn that the farmer had any suspicion of its ever being intoxicating or poisonous, as is the case occasionally with that made by the Bhoura (*Apis irritabilis*), or large wild bee in the northern mountains of Gurwhal, from feeding, as it is reported, on the flower of the monkhood. I was directed more particularly to inquire upon this subject, by having observed this plant in flower in the valley of Bunga, a few miles to the eastward of the bee district, and think probable that it extends to these mountains.—The peasantry of Cashmere are unacquainted with the employment of honey as the basis of a fermented liquor, but eat it raw or mixed with articles of common food, whilst the most wealthy substitute it for sugar in

preserving fruits. It is customary to take the hive every year; about the end of September or beginning of October is found the best season for this operation, a little time still remaining for the bees to add to the portion left for their support during five months. This amounts to about one-third of the whole produce, and would appear to suffice, as swarms seldom die, and the Cashmeres substitute no other article of food. It is stated that an old swarm yields more honey than a young one, and that families seldom die except of old age. I was informed that it was no uncommon circumstance to preserve the same community for ten or even fifteen years; and some instances were quoted of a family having been retained for twenty years; but this was held to be a very rare occurrence. In consequence of the bees being thus literally domesticated, they acquire a mildness of conduct far more decided than those of Europe; and it is possible that the confidence thus gained, subduing their natural irascibility, may generate an increase of industry, or at least an increase of produce in relation to the number and size of the individuals of each community. It is also clear, that the situation of the hive keeps many of the natural enemies of the bees at a distance.—The bee of Cashmere is a little smaller than that of Europe, though a little larger than the domesticated bee of Kumaon and of Gurwhal. The Bhoura, the rock-bee of Gurwhal, or the bee of the southern mountains, is, on the other hand, greatly larger than the domesticated bee of Europe, and greatly exceeds it also in the number of individuals in each community, and in the size and weight of its combs. But its honey is sometimes contaminated by an intoxicating quality, and the temper of the insect is so irritable, as to be brought into a dangerous state of activity by a slight show of aggression. The former quality is suspected, upon probable grounds, to be caused by the secretion of the aconite eaten by the bee, and its irritability of disposition, to be owing partly to the exposed situation of the combs suspended from the lower surface of a ledge of rock, and partly to the occasional attempts of bears to carry them off. But these detractions from the merits of this bee are merely the result of localities; and under due precautions, it is presumed that its irascibility might be so far subdued as to render it just as safe an inhabitant of a wall-hive, as the smaller variety of bee. In a portion of the Punjab, near the hills, this bee is also met with; and I have seen the under surface of the principal branches of a large Peepul tree studded with so many colonies, individually of such great strength, as to deter the neighbouring peasantry from attempting to deprive them of their stores, notwithstanding it was conjectured that there were several hundredweight of combs on the tree. The largest of these assemblages of combs—the probable accumulation of many seasons—was of such a size as I think it not prudent to cite; but from the specimens I have seen of the produce of this bee, I conceive their domestication, if introduced into Europe, would prove a most valuable acquisition to this branch of farming, although I must confess myself unable to devise any safe and easy plan for transporting such a colony.—*Mr William Moorcroft in the Journal of the Royal Geographical Society.*

VI. *Manners of the Fifteenth Century.*—The following extract from the *Journal of Elizabeth Woodville*, before her marriage with Sir John Grey, is taken from an ancient manuscript in Drummond Castle, the seat of Lord

Willoughby d'Eresby: it gives a curious picture of the habits of the great in former times. After the death of Sir John Grey, she became, in 1445, the Queen of Edward IV. On the accession of Henry VII. who had married her daughter, she was confined in the nunnery of Bermondsey, and died there, but was buried at Windsor.—"Monday, March 9. Rose at 4 o'clock and helped Catherine to milk the cows; Rachel, the other dairy-maid, having scalded her hand in so bad a manner the night before. Made a poultice for Rachel, and gave Robin a penny to get her something comfortable from the apothecary's.—6 o'clock. The buttock of beef too much boiled, and the beer a little of the stalest. Memorandum: To talk to cook about the first fault, and to mend the second myself by tapping a fresh barrel directly.—7 o'clock. Went to walk with the lady my mother into the court-yard. Fed 25 men and women: chided Roger severely for expressing some ill will at attending us with broken meat.—8 o'clock. Went into the paddock behind the house with my maid Dorothy; caught Thump the little pony myself, and rode a matter of six miles without saddle or bridle.—10 o'clock. Went to dinner. John Grey, a comely youth! but what is that to me?—a virtuous maiden should be entirely under the direction of her parents. John ate but little, and stole a great many tender looks at me, and said, 'Women never could be handsome, in his opinion, who were not good tempered.' I hope my temper is not intolerable; nobody finds fault with it but Roger, and he is the most disorderly serving-man in our family. John Grey likes white teeth; my teeth are of a pretty good colour I think, and my hair is as black as jet, though I say it; and John, if I mistake not, is of the same opinion.—11 o'clock. Rose from table, the company all desirous of walking in the fields; John Grey would lift me over every stile, and twice he squeezed my hand with great vehemence. I cannot say I should have any objections to John Grey; he plays at prison-bars as well as any country gentleman, and he never misses church on Sundays.—3 o'clock. Poor farmer Robinson's house burnt down by an accidental fire. John Grey proposed a subscription for the benefit of the farmer, and gave no less than four pounds himself for the benevolent intent. Memorandum: Never saw him look so handsome as at that moment.—4 o'clock. Went to prayers.—6 o'clock. Fed the hogs and poultry.—7 o'clock. Supper on the table: delayed in consequence of farmer Robinson's misfortune. Memorandum: The goose-pie too much baked, and the pork roasted to rags.—9 o'clock. The company fast asleep; these late hours very disagreeable. Said my prayers a second time, John Grey distracted my thoughts too much the first time. Fell asleep, and dreamed of John Grey."

VII. *Old English Archery.*—The feat of good archery with Edward VI. was, that a hundred of his youth, in rank, should send, at one discharge, their hundred shafts clear through an inch-board of heart of oak, at the distance of 240 yards. This was the minimum of military archery with youth. It was at the battle of Falkirk, in 1298, that the power of English archery became supreme. Edward I. interspersed his long bowmen among his other troops of every description, and the battle was little less than an unresisting slaughter of the best of the Scottish warriors. At the battle of Flodden Field, the Scottish monarch, enraged at the slaughter of his troops, directed sixty of his bravest knights, in Italian armour, to rush on a body of the English archers, and, at

the first discharge, every knight was killed by an arrow through his body P. de Comines, speaking of the military power of England, France, and Scotland, lays it down that 'the might of the realm of England standeth on her archery;' and it is curious to trace the excessive fastidiousness and care of our ancestors with respect to it. Edward IV. directed that the long-bow should be made of ewye, wyche, hazel, ash, awnrub, or reason tree, but the ewye (yew) was the preferable wood. The string was to be made of hide, gut, horse hair, woman's hair, hemp, or silk. The bow was directed to be the precise height of the archer, and one of six feet long was the maximum of power.—The most anxious care was bestowed on the arrow. Its length was to be exactly half that of the bow. The feathers were not to be plucked from the goose, but were to drop from the bird at between the age of two and three years. Two of the feathers were to be from the gander, whilst the third, always placed uppermost in the act of shooting, was to be dropped by the goose. The arrow was pointed with flint or steel; and the punishment severe, if the directions were in any respect violated. It was illegal, and what was perhaps worse, it was disgraceful, to shoot at a less distance than 220 yards. The longest shot upon record was that of the Lancashire archer, who shot his shaft a mile in three shoots. This has been nearly equalled within these few years. A Turkish ambassador, in London, discharged an arrow 480 yards, and a Turk, at Athens, sent his shaft 584 yards, which is only three yards short of the third of a mile. It was a test with our archers, to send the cloth-yard shaft, at 320 yards distance, through an oaken plank, from one to three inches in thickness, and to lodge the arrow in a board placed many yards in the rear.—*United Service Journal.*

VIII. *Carriages.*—Wheel-carriages for pleasure are generally supposed to have first come into use in England in the reign of Queen Elizabeth. But long before that time, carriages of some sort were used on state occasions, or for the conveyance of sick persons. Even in the time of the Saxons, a clumsy kind of car, on four wheels, was employed to carry great personages; and Stow tells us, that, during Wat Tyler's insurrection in 1380, Richard the Second, "being threatened by the rebels of Kent, rode from the Tower of London to the Miles End, and with him his mother, because she was sick and weak, in a *whirlicote*," which is supposed to have been a sort of covered carriage. "Chariots covered, with ladies therein," followed the litter in which Queen Catherine was carried to her coronation with Henry the Eighth. But Queen Elizabeth's is the first that was called a *coach*. In 1564, William Boonen, a Dutchman, became the Queen's coachman, and about this time coaches were brought into general use in England. In 1588, Queen Elizabeth went from Somerset House to Paul Cross, to return thanks on the destruction of the Spanish Armada, in a coach presented to her by Henry, Earl of Arundel. These coaches must have been clumsy uncomfortable machines. They had no springs; and the state of the streets and roads must have made travelling in them any thing but easy. But fashion brought them into such general use, that, in 1607, Dekker complains that "the wife of every citizen must be jolted now." And, in 1636, there were 6000 of them kept in London and the neighbourhood. At first they had only two horses, but afterwards the number was increased. In the reign of James the First, "the stout old Earl of

Northumberland, when he was got loose, hearing that the great favourite Buckingham was drawn about with a coach and six horses, thought he might very well have eight in his coach, with which he rode through the city of London to the vulgar talk and admiration." In general, however, it was thought disgraceful in those times for the male sex to ride in coaches. "In Sir Philip Sydney's times, so famous for men at armes, it was then," says Aubrey, 'held as great a disgrace for a young gentleman to be seen riding in the streets in a coach, as it would now for such a one to be seen in the streets with a petticoat and waistcoat, so much is the fashion of the times altered.' Sir Walter Scott says, it is a tradition in Scotland that chaises or chariots were first introduced into that country in 1745. Before that time, the nobility were accustomed to travel in vehicles somewhat resembling Noah's Ark, and the gentry on horseback; but in that memorable year, the Prince of Hesse appeared in a carriage of this description, "to the admiration of all Scotchmen, who regarded it as a coach cut in half." When we compare the clumsy things in which even our kings formerly rode, with the convenient and light carriages of the present day, we cannot help admiring the progress which our workmen have made in this and every other branch of art, and hoping that their skill may always find that encouragement which it so well deserves.—*From a paper in the Archæologia, by J. H. Markland, Esq.*

IX. *Ancient Marks on Paper.*—Every one knows how often we are obliged to refer to ancient times to explain common terms of art, and words which are in every one's mouth. We have a curious instance of this in the names which are given to the different sorts and sizes of paper. We all talk of *foolscap-paper*, *post-paper*, and *note-paper*; and paper-makers and stationers have other terms of the same kind, as *hand-paper*, *pot-paper*, &c. Now, the term note-paper is clear enough, as it evidently means paper of the size fit for notes; while *post-paper*, we may suppose, means the larger size which is used for letters sent by the post. But when we come to *foolscap* paper we are altogether at a loss for an explanation; and here we find we must look to something else than the size of the paper, as to the origin of the name. Now, if we go back to the early history of paper-making, we find that terms which now puzzle us so much, may easily be explained by the various paper *marks* which have been used at different times. In ancient times, we know, when very few people could read, pictures of every kind were very much in use where writing would now be employed: every shop had a sign, as well as every public-house; and these signs were not then, as they very often are now, only printed on a board; they were always either painted pictures, as many inn-signs still are, or else models of the thing which the sign expressed, as we still sometimes see a bee-hive, a tea-canister, or a doll. For the same reason, printers had always some device which they put upon the title-pages, and at the end of their books; and paper-makers used marks to distinguish the paper of their manufacture from that of others. Some of these marks becoming common, naturally gave their name to different sorts of paper; and as names, we all know, remain very often long after the origin of them is forgotten, and the circumstances changed, we shall not be surprised to find the old names still in use, though perhaps, in some cases, they are not applied to the same things they originally denoted. It will be the best way, perhaps,

to mention briefly the chief paper-marks which have been used, as they occur in the order of time. The first paper-maker in England is supposed to have been John Tate, who is said to have had a mill at Hertford: his device was a star of five points within a double circle. The first book printed on paper manufactured in England, was a Latin one, entitled *Bartholomeus de Proprietatibus Rerum*: it was printed in 1405 or 1406: the paper seems to have been made by John Tate, the younger, and had the mark of a wheel. The paper used by Caxton, and other early printers, had a great variety of marks, of which the chief are the ox-head and star, the letter P, the shears, the hand and star, a collared dog's head, with a trefoil over it, a crown, a shield, with something like a bend upon it, &c. The ox-head, sometimes with a star or flower over it, is the mark of the paper on which Faust printed some of his early books: but the open hand, which was likewise a very ancient mark, remained longer in fashion, and probably gave the name to what is still called *hand-paper*. Another very favourite paper-mark, at a somewhat later period, was the jug or pot, which seems to have been the origin of the term *pot-paper*. It is sometimes found plain, but oftener bears the initials or first letters of the maker's name: hence there is a very great variety of figures, every paper-maker having a somewhat different mark. The hand and pot marks existed from 1539 to 1639, as may be seen in old Bibles. The foolscap was a later device, and does not seem to have been nearly of so long continuance as the former. It has given place to the figure of Britannia, or that of a lion rampant, supporting the cap of liberty on a pole: the name, however, has continued, and we still denominate paper of a particular size by the title of foolscap-paper. The figures have the cap and bells, which we so often read of in old plays and histories, as the particular dress of the fools, who formerly formed a part of every great man's establishment. Post-paper seems to have derived its name from the post-horn, which was at one time its distinguishing mark. This is of later date, and does not seem to have been used before the establishment of the General Post-Office, when it became the custom to blow a horn. This mark dates from 1670 to 1679. The mark is still sometimes used; but the same change which has so much diminished the number of painted signs in the streets of our towns and cities, has nearly made paper-marks a matter of antiquarian curiosity, the maker's name being now generally used.—*Saturday Magazine, No.* 11.

X. *The Origin and Progress of Newspapers.*—For an Englishman not intimately acquainted with the former history of his country, but who was now approaching "the age of man," it would be very natural to suppose that, although he has observed newspapers to have increased prodigiously in size and numbers within the last fifty years, yet that their progress was like that of our roads. He might reasonably suppose, that, though fewer, less frequent, and smaller—in every point unlike those of the present day,—still that they were in existence from time immemorial. The invention of printing, indeed, might have made the multiplication of copies infinitely more easy, still there s nothing of itself absurd in supposing, that newspapers, like our historical records, might have circulated in England from the time of Alfred and before. The fact, however, is strikingly the reverse. Nothing of the kind had any me or any being in our country for more than 500 years after the Norman

quest. Venice is entitled to the honour of having produced the first *etta*; and yet its jealous government, long after the invention of printing, ved it to be distributed only in manuscript. The origin of the first tte in England is very curious, and interesting to every Englishman; it is this. When the Spanish Armada was in the English Channel, du- the year 1588, many false reports were naturally spread, calculated to n and dispirit the people of this island. To prevent these mischiefs, ugh a season of intense anxiety, the government had recourse to the ex- ent of publishing real information. And (as Chalmers expresses it in his of Ruddiman) it may gratify our pride to be told, that mankind is in- ed to the wisdom of our Elizabeth, and the prudence of her minister leigh, for the first newspaper. The earliest gazette of this kind was en- d *The English Mercurie*, which, *by authority*, was "imprinted at London, Christopher Barker, her Highnesse's printer, 1588." In the first of these spapers, preserved in the British Museum, under the date of July 26. l, is the following notice: "Yesterday the Scots ambassador, being in- uced by Sir Francis Walsingham, had a private audience of her Majesty, hom he delivered a letter from the king his master (James VI. of Scot- , her successor on the throne of England), containing the most cordial as- nces of his resolution to adhere to her Majesty's interests, and to those of Protestant religion." And it may not be here improper to take notice of se and spirited saying of this young prince (he was twenty-two), to the en's minister at his court, viz. "That all the favour he did expect from Spaniards was the courtesy of Polypheme to Ulysses, *to be the last ured.*" I defy (observes Chalmers) the gazetteer of the present day to a more decorous account of the introduction of a foreign minister. leigh's newspapers were all Extraordinary Gazettes, published from time me, as that profound statesman wished to inform or terrify the people. Mercuries were probably first printed in April 1588, when the Armada oached the shores of England. After the Spanish ships had been dis- ed, these Extraordinary Gazettes seldom appeared. On November 24. l, the Mercurie informed the people, that "the solemn thanksgiving for success against the Spanish Armada was this day strictly observed." It been confidently, but ignorantly, asserted, that newspapers were invented he French in the time of Richelieu, who gave Theophrast Redaunot a nt for the Paris Gazette. But this was first published in 1631. The s demonstrate that the pleasures and benefits of a newspaper were en- l in England more than forty years before the French possessed any thing e kind. A newspaper had now gratified the curiosity of the people, and people would no longer be gratified without a newspaper, though the lish Mercurie ceased when the occasion which gave it birth had passed '. They were at first occasional, and afterwards weekly. The title of irst was, "*The News of the Present Week.*" During the civil wars, the try was inundated with those occasional "News." Still, they were : of the character of pamphlets than of newspapers. In 1655, the *'on Gazette* was published under the title of the *Oxford Gazette*, it hav- been printed at that University during a session of Parliament, held : on account of the plague then raging in London. This was reprinted

in London, in two small folio pages, "for the use of some merchants and gentlemen who desire the same." From 1661 to 1688, no less than seventy papers were published under different titles. From an advertisement in the *Athenian Gazette*, 1690, it appears that the coffee-houses in London were then supplied with 9 newspapers. In 1696, there seems not to have been any daily paper, though it has been said that the *London Courant* was published daily. As early as the reign of Queen Anne, London enjoyed the luxury of a newspaper every day; though, even in 1709, the *Daily Courant* was the only paper published every day, Sundays of course excepted. The rest were published three times a-week, or less frequently. In 1724, the number was 8 daily, 6 weekly, 7 three times a-week, 3 *Halfpenny Posts*, published three times a-week, and the *London Gazette* twice a-week. In 1815, the number of newspapers in Great Britain had risen to 252. Of these, 55 were published in London, 15 daily, and 40 periodically; 122 in the country parts of England; 28 in Scotland; and 49 in Ireland. The total number of these papers printed during three months, ending 1st April 1815, was 5,890,621, making the annual average 22,762,764. In the year 1829, the number of the newspapers published in the metropolis alone amounted to about 18,000,000; in 1830, to nearly 20,000,000; and in 1831, it was upwards of 22,000,000.—*Saturday Magazine*, No. 9.

XI. *Calendar and Almanack.*—The word Calendar (which is sometimes spelt Kalendar), is, properly, a *register of time or dates*; in which acceptation it was used by the Romans, as the word ALMANACK was by the Germans, and our Saxon forefathers. Calendar, as some state, is derived from the Latin *Calendarium*, which was the account-book kept by the Roman usurers of the money which they lent out upon interest, and which they were in the habit of calling in, or claiming, on the *Calends*, or first day of each month. But it is more probable that the words Calendar and Calendarium, are both to be traced to the ancient Roman custom of public proclaiming or *calling* the *Calends* and other periods of each month, on the appearance of every new moon. This practice continued until the year 450 after the building of Rome, when Caius Flavius, the Ædile or chief magistrate, ordered the *Fasti*, or *Calends*, to be affixed upon all the places of public resort, in order that the dates of the approaching festivals might be more generally and exactly known. In fact, these public notices or registers of coming events, were called *Fasti Calendares*. The etymology, or derivation of Almanack has been much disputed; many writers derive it from the Arabic article *Al* (the) and the Greek word *manakos* (a lunar circle); others, from the Hebrew *manach* (to count); whilst Dr Johnson says, that the Greek word *men*, pronounced *maen* (a month), enters into its composition. The explanation given by the celebrated antiquarian Verstegan, of the origin and use of this word, seems worthy of notice. He says, "our Saxon ancestors used to engrave on certain square sticks, about a foot in length, the courses of the moons of the whole year, whereby they could certainly tell when the new moons, full moons, and changes should happen; as also their festival-days: and such a carved stick they called an ALL-MON-AGHT; that is to say *Al-mon-heed*, to-wit, the regard or observation of all the moons, and hence is derived the name of Almanack."—An instrument of this kind, of a very ancient date, is to be seen in St John's College,

Cambridge; and there are still in the midland counties, several remains of them.

(1.) *Years.*—The word Year is purely Saxon, and is supposed by some to be derived from *æra*: whilst others deduce both words from the Greek *ear*, or Latin *ver* (Spring); because many of the ancients were in the habit of dating the commencement of the year from Spring. In the Hebrew, Greek, and Latin languages, the word *year* is expressive of a ring or *circle*.—the Egyptians also represented it by a snake placed in a *circular* position, with its tail in its mouth; whence, perhaps the name of the *Zodiac*, or that *imaginary* circle which is made by the sun in the heavens, during the twelve months. The time in which the sun performs its journey through the twelve *signs* of the Zodiac, comprehends 365 days, 5 hours, 48 minutes, and 48 seconds, and is therefore styled the NATURAL, SOLAR, or TROPICAL YEAR. The Sidereal, or Astral year, is the time which elapses from the sun's passage from any particular fixed star, until its return to it again, and is just twenty minutes and twenty-nine seconds longer than the natural or solar year. The Lunar year consists of twelve lunar months, or that period during which the moon passes twelve times through its various phases, or changes. The common or civil year, in use with us and established by law, contains 365 days during *three successive years*, but in each *fourth* year, an *intercalary* or additional day is inserted, in order to make up the number 366, such additional day being considered equivalent to the time lost by not counting the five hours and forty-nine minutes at the end of each of the four years, from one BISSEXTILE, or LEAP year to another. The word *leap*, sufficiently explains the act of passing over the hours in question. This plan was invented by Julius Cæsar, or by Sosigenes, the Egyptian mathematician, who assisted him in rectifying the Calendar. The additional or *intercalary* day, is with us always placed in the month of February, which consequently in *Leap* Year consists of twenty-nine days, the usual number being 28. Cæsar placed it in the month of March, by reckoning the sixth day of the calends of that month *twice over*, hence the term *Bissextile*, from the words *bis* (twice) and *sex* (six), or *sextilis* (sixth day). But by the Gregorian alteration, the fourth year coming at the close of a century is not a leap year, unless the number of hundreds be a multiple of four. Thus 1600 was a leap year, 1700 and 1800 were not, 2000 will be. The reckoning of time by the course of the sun or moon, was attempted in various ways by different ancient nations; but they finding that their minor divisions of time did not correspond with the courses in question, endeavoured to prevent confusion by ordaining a certain number of days to be *intercalated*, or inserted, out of the common order, so as to preserve the equation of time. The *Egyptian* year (as used by Ptolemy) consisted of 365 days, which were divided into twelve months of thirty days each, besides five *intercalary* days at the end. The Egyptian *Canicular*, or *natural* year, was computed from one *heliacal* rising of the star Sirius, or *Canicula*, to the next. By the regulation of Solon, the ancient *Greek* year was *lunar*, and consisted of twelve months; each containing thirty and twenty-nine days alternately; and, in every revolution of nineteen years, the third, fifth, eighth, eleventh, sixteenth, and nineteenth, it had an *intercalary* month, in order to keep the New and Full Moons to the same seasons of the year. The ancient *Jewish* year was the same as the

Greek one, only that it was made to agree with the Solar year by adding eleven and sometimes twelve days at the end; or an *intercalary* month when necessary. The modern *Jewish* year consists of twelve lunar months generally; but sometimes of thirteen, that is, when an *intercalary* month is inserted. The *Turkish* year consists of twelve lunar months of thirty and twenty-nine days alternately, sometimes of thirteen. The ancient *Roman* year, as settled by Romulus, was *lunar*, but contained only ten months, which were irregular, and comprehended 304 days in all; being a number fifty days short of the true *lunar* year, and sixty-one days of the *solar*. Romulus added the requisite number of days at the end of the year. Numa Pompilius added two months making the year to consist of 355 days, thereby exceeding the *lunar* year by one day, but being short of the *solar* one by ten days. Julius Cæsar during his third consulship, and whilst he was Pontifex Maximus, or high priest of Rome, reformed the calendar by regulating the months according to their present measure, and adding an intercalary day every fourth year to the month of February: but he being assassinated before his plan could be fully brought into operation, the Emperor Augustus perfected and established what his kinsman had begun. The *Julian* year, which consisted of 365 days and 6 hours, was, however, still incorrect; for it was found to be too long by about eleven minutes, which in 131 years would be equal to one day: consequently there was a further reformation of the calendar by Pope Gregory, in the year 1582. He cut off eleven days, by calling the fourth of October the fifteenth. This alteration of the *style* was gradually adopted in the several countries of the European continent; but in Russia, in some of the Swiss cantons, and in the countries of the East, the *old style* is still preserved. The Parliament of England adopted the *Gregorian* plan, in 1752, by enacting that eleven days should be *omitted* that year, all dates therefore, previous to 1752, are said to be according to the Old Style; whilst those since that period, are deemed to be according to the New Style. In 1800, which was properly a bissextile, or leap year, the intercalary day was omitted; hence, the difference between the old and new style is now twelve days. The *Gregorian* regulation does not absolutely preclude all error in future; but that is likely to be so trifling, as not to require particular attention. The beginning of the year has by no means been the same in different ages and countries. The Chaldeans, the Egyptians, and the Jews, in all civil affairs, began it at the *autumnal equinox*. The ecclesiastical year among the Jews, the common year of the Persians, and of the Romans under Romulus, commenced in spring; a mode still followed in many of the Italian states. Both the *equinoxes*, as well as the *summer solstice*, were each the commencing date in some of the states of Greece. The Roman year, from the time of Numa, began on the calends of January; the Arabs and Turks compute from the 16th of July; the christian clergy formerly commenced the year on the 25th of March*; a method observed in Great Britain, generally, in civil affairs, until 1752; from which period our civil year was begun on the 1st of January, except in some few cases, in which it still commences on the "Day of Annunciation," or the 25th of March. In Scot-

* The Church of Rome dated from the Sunday succeeding the full moon which occurred next after the vernal equinox; or, if the full moon happened on a Sunday, the new year commenced that day.

land, the year was by a proclamation, bearing date so early as the 27th of November 1599, ordered thenceforth to commence in that kingdom on the 1st of January, instead of the 25th of March. The English Church, still, in her solemn service, renews the year on the *First Sunday in Advent*, which is always that next to or on *St Andrew's Day*. Our ancestors, after the establishment of Christianity, usually began their year at *Christmas*, and reckoned the commencement of their *æra* from the incarnation, or birth of Christ. William the Conqueror, however, introduced the method of substituting the first year of his own reign for the christian æra. At subsequent periods, the English reverted to the ancient custom; but all State proclamations, patents, charters, and acts of Parliament, have continued to be dated from the commencement of the reigns of the respective sovereigns, with the addition of the words, "and in the year of our Lord," &c. The Russian government did not adopt the Christian æra until the time of Peter, in 1725; their previous practice had been to reckon from the world's age, or the *year of the creation*.

(2.) *Months.*—This division of the year appears to have been used before the flood*; and as it is naturally framed by the revolutions of the Moon, the Months of all nations were originally *lunar*, that is, from one new Moon to another. In a more enlightened period, the revolutions of the Moon, were compared with those of the Sun, and the limits of the months, as the component parts of a year, were fixed with greater precision. The Romans divided each month into *Calends*, *Nones*, and *Ides*; the *Calends* were the first day of the month, the *Nones* were the seventh, and the *Ides* the fifteenth of March, May, July, and October; in the other months, the *Nones* fell on the 5th and the *Ides* on the 13th. The days of each month, according to this form, were counted backwards; thus, the 18th of October was called *the 15th day before the Calends of November, &c.* In the year 1793, the French Government had a new Calendar constructed, in which they adopted the following fanciful designations for each month:—

	French Months.	*Signification.*	*Eng. Months.*
Autumn.	1. Vindemaire,	Vintage Month, from . .	Sept. 22.
	2. Brumaire .	Foggy Month . . .	Oct. 22.
	3. Frimaire .	Frosty, or Sleety Month . .	Nov. 21.
Winter.	4. Nivose .	Snowy Month . . .	Dec. 21.
	5. Pluviose .	Rainy Month . . .	Jan. 20.
	6. Ventose	Windy Month . . .	Feb. 19.
Spring.	7. Germinal .	Springing or Budding Month,	Mar. 21.
	8. Floreal .	Flowering Month . . .	April 20.
	9. Prairial .	Hay Harvest Month .	May 20.
Summer.	10. Messidor	Corn Harvest Month . .	June 19.
	11. Thermidor	Heat Month . .	July 19.
	12. Fructidor	Fruit Month . . .	Aug. 19.

This *new* Calendar, which, after all, was only a plagiarism, or copy of one used in Holland from time immemorial, like many of the absurd institutions which sprang from the French Revolution, was laid aside in a few years, from the circumstance of its utter unfitness for the seasons, even as they occur in the several provinces of France itself; how much less applicable, therefore

* Noah, as we find it recorded in the Bible, reckoned by months of 30 days each; and from him that mode of computing the year is supposed to have been adopted by the Chaldeans, Egyptians, and other Oriental nations.

must they have been to other countries, where the climates and seasons vary so much from each other! A Calendar to be worthy of universal adoption, must be capable of universal application: not so that of the French *Philosophers*, which, independently of its discordance with those of all civilized nations, had not even the merit of indicating those very seasons from which it professed to derive its character. The late Mr Gifford, ridiculed this new-fangled method of registering time by the following ludicrous but happy translation of the Republican months and seasons:—

AUTUMN . .	Wheezy, sneezy, freezy;
WINTER . .	Slippy, drippy, nippy;
SPRING . . .	Showery, flowery, bowery;
SUMMER . .	Hoppy, croppy, poppy.

(3.) *Weeks.*—It is probable that this measure of time has existed in the East from the earliest ages; but the Greeks certainly never used such a mode of division. They divided each month of thirty days into three *Decades*, or equal portions of ten days each. Thus, the 5th day of the month was the 5th day of the *first* Decade; the 15th was the 5th of the *second* Decade; and the 25th, the 5th of the *third* Decade. This division was adopted by the French in their revolutionary calendar, in order to get rid of the Sabbath day. The Jews have ever marked their time by *sevenths*; according to the command given by God himself, for labouring during only *six* days of each week, and resting on the seventh, which was consequently set apart, or consecrated, to the service of their Creator; nay, they not only hallowed the seventh day, or Sabbath, which formed a portion of their *week of days*, but they had also their *week of years*, which consisted of seven years; and their *Jubilees*, or rejoicing periods, which were celebrated by many acts of justice, forgiveness, and restitution, at the end of every *week of seven times seven years*. The Hebrews, the Assyrians, Egyptians, Arabians and Persians, all had this custom of reckoning by weeks. The origin of computation by *sevenths*, has been vehemently contested by some authors; who say that the four quarters or intervals of the Moon (the *phases* or changes, of which are about seven days distant) originally gave occasion to this mode of division. But it seems more reasonable to conclude, that it arose from the traditional accounts of the *first seven days* of the world's existence. Although each *lunar* month contains four weeks, or four sevenths, the *solar* month, or that regulated by the passage of the Sun through each of the twelve signs of the Zodiac, generally contains two or three days more; consequently, as we have twelve solar months in each year, we have fifty-two weeks and one day over, instead of forty-eight weeks, which would be the exact number, were our year regulated merely by the revolutions or changes of the moon. The word Week is of Saxon origin and signifies a *numerical series*, generally, (having nearly the same meaning as *way*, which is measured by successive steps,) although now expressive only of the space of *seven days*.

(4.) *Days.*—The word Day is derived from, or synonymous with, the Saxon *Daeg*; and the Saxons are supposed to have had it from the same source as the Roman word *Dies* (a day), which, in its turn, is said to be derived from *Dii*, or Gods; by which name the Romans called the planets. The

word Day, in its strict sense, signifies that portion of time, during which we receive the light of the sun; but more properly speaking, it includes the *night* also, and is that space of time during which the sun *appears to us* to make one revolution round the earth; to speak with astronomical precision, it is that space of time in which the earth makes one revolution round its own axis, during its annual or yearly progress around the sun. In different nations and ages, the modes of reckoning the beginning of the day have been various. According to the computation of the ancient Syrians, Babylonians, Persians, and the inhabitants of Hindostan, the day commenced at the *rising of the sun*; with the modern Greeks, it is the same. The Athenians, and the other ancient inhabitants of Greece, as well as the ancient Gauls, began theirs at *sun-set*, which mode is still followed by the Jews, the Austrians, the Bohemians, the Silesians, the Italians, and the Chinese. The ancient inhabitants of Italy computed their day from midnight; which mode is now in common use with us and all other European nations, with the above exceptions. The Mahometans calculate from one *twilight* to another. The ancient Egyptians dated from noon to noon; which mode is at this day, and has always been, followed by astronomers; because that *instant of time* can be ascertained with greater precision than any other. The Romans gave to each of the *seven* days of their week, the name of one of the heavenly bodies: thus, *Dies Solis*, signifies the day of the sun (*Sunday*); *Dies Lunæ*, the day of the moon (*Monday*); *Dies Martis*, the day of Mars (*Tuesday*); *Dies Mercurii*, the day of Mercury (*Wednesday*); *Dies Jovis*, the day of Jupiter (*Thursday*); *Dies Veneris*, the day of Venus (*Friday*); and *Dies Saturni*, the day of Saturn (*Saturday*). From this source, the English language has received Sunday, Monday, and Saturday, by *translation*; but Tuesday, Wednesday, Thursday, and Friday, were derived from the ancient Saxon and Danish deities, TUESCO, WODIN, THOR, and FREYA, or FREGA. In all Parliamentary bills, acts, journals, and other documents, the Roman names of the days of the week have at all times been used.—*Saturday Magazine*, No. 31.

XII. *London Post Office.*—The regularity with which the business of the Post-Office is conducted is truly surprising. There are two periods of meeting in the day: one for the distribution of the letters that come up from the country, and another for the dispatch of those that are to be sent down. The first commences at six in the morning, and the task is accomplished by half-past eight or nine, except when the mails are delayed by the badness of the roads. The letters are counted, and the amount of postage taken, so as to check the accounts of the country post-masters; they are then examined to tell whether the charges on them are accurate, stamped with the date, and arranged for the letter-carriers, to whom they are counted twice over. The postage is paid to the Receiver-General three times a-week, when the amount of each letter-carrier's delivery from every day is again checked. The despatch of letters in the evening is conducted in the same admirable system as their distribution in the morning; the whole business being performed in three hours, from five to eight. The letters are first taken out of the receiving-house and arranged in different compartments, named after the mails sent out. This is done by the junior clerks, who thus acquire a perfect knowledge of the situation and distance of all the post-towns; the senior

clerks then mark on the letters the proper rate of postage, which they do at an average of one letter per second; and the letters are placed in boxes, labelled with the names of the towns. When the receiving-office closes, the letters for each town are summed up, put in the bag, and a copy of the amount is sent with them. The letter-bags, tied and sealed, are all delivered to the respective guards of the mail-coaches by eight o'clock. According to a calculation made in the month of May 1828, it appears that the daily average number of letters brought into London by 24 mails was 28,466,—17,359 of which were delivered east of Temple Bar, and 13,107 west of the same place, making at the same daily rate 170,802 letters each week, and 8,881,704 in the course of the year. The following list shows the number of letters sent at the same period from various towns, together with their delivery east and west of Temple Bar:—

	Total.	East.	West.		Total.	East.	West.
Liverpool, . . .	552	406	146	Cambridge, .	294	145	149
Bath, . . .	529	226	303	Leeds, . . .	246	191	55
Birmingham, .	475	335	140	Cheltenham, .	232	100	132
Manchester, .	458	353	105	York, . . .	152	80	72
Glasgow, . .	349	344	105	Sheffield, . .	142	105	37
Oxford, . . .	272	117	155	Newmarket, .	98	30	68

The Two-Penny, or, as it was called when first established, the Penny-Post, was set up in the year 1683, by a private individual, for the conveyance of letters and small parcels. The first notice of the Penny-Post, however, in the Statute-book, occurs in the 9th year of the reign of Queen Anne, when it was very essentially improved, although it may be said to have been originally instituted in 1683. The number of letters delivered by the Two-Penny Post is about 40,000 daily, or 12,520,000 in a year. If this be added to the delivery of the General Post, it makes a total yearly amount of 21,510,704 letters, or about 413,000 each week. The number of letters delivered annually by the Paris post-office is about fourteen millions and a half, of which about nine millions come from the departments.

XIII. *The Water Spider.*—The habitation of this insect (*Aranea aquatica*) is chiefly remarkable for the element in which it is constructed, and the materials that compose it, being built in the midst of water and in fact of air, a very uncomfortable one certainly, were it constantly wet; but this, the sagacious insect has the means of avoiding, and by availing itself of some well known philosophical principles, constructs for itself an apartment in which it resides in comfort and security. The following is the process: *First*, it spins loose threads in various directions to the leaves of water plants, which may be called the frame-work of the chamber, and over them spreads a transparent varnish, resembling liquid glass, which issues from the middle of its spinners, and which is so elastic as to be capable of great expansion and contraction. The spider then spreads over its belly a little of the same material, and ascends to the surface. The precise mode in which a bubble of air is drawn in beneath the gummy matter is not accurately known; loaded, however, with the material for its little mansion, which, to the spectator, looks like shining quicksilver, the spider plunges to the bottom, and, with as much dexterity as a chemist transfers gas into a gasholder, introduces the bubble of air beneath the roof prepared

for its reception. This manœuvre is repeated ten or twelve times, until, at length, in about a quarter of an hour, as much air is obtained as is sufficient to expand the apartment to its proposed extent, and the industrious little builder now finds itself in possession of a perfect air-built dwelling, affording a commodious and dry retreat in the very midst of water. Here the inhabitant reposes, unmoved by the storms that agitate the surface of the pool, and devours its prey at ease and in safety.

XIV. *The Possibility of naturalising the Fire-Fly.*—It abounds not only in Canada, where the winters are so severe, but in the villages of the Vaudois, in Piedmont. These are a poor people, much attached to the English, and at ten shillings per dozen, would no doubt deliver in Paris, in boxes properly contrived, any number of these creatures in every stage of their existence, and even in the egg, should that be desired; and if twenty dozen were turned out in different parts of England, there cannot remain a doubt, but that, in a few years, they would be common through the country; and, in our summer evenings, be exquisitely beautiful.—*Mag. Nat. Hist.*

XV. *Vocal Machinery of Birds.*—It is difficult to account for so small a creature as a bird making a tone as loud as some animals a thousand times its size; but a recent discovery has shown, that in birds the lungs have several openings communicating with corresponding air bags or cells, which fill the whole cavity of the body from the neck downwards, and into which the air passes and repasses in the progress of breathing. This is not all: the very bones are hollow, from which air-pipes are conveyed to the most solid parts of the body, even into the quills and feathers. This air being rarefied by the heat of their body, adds to their levity. By forcing the air out of the body, they can dart down from the greatest heights with astonishing velocity. No doubt the same machinery forms the basis of their vocal powers, and at once solves the mystery.—*Gardiner's Music of Nature.*

XVI. *Blasting Rocks under Water by means of the Diving-Bell.*—Three men are employed in the diving-bell; one holds the jumper, or boring iron, which he keeps constantly turning; the other two strike alternately quick smart strokes with hammers. When the hole is bored of the requisite depth, a tin cartridge, filled with gunpowder, about two inches in diameter, and a foot in length, is inserted, and sand placed above it. To the top of the cartridge a tin pipe is soldered, having a brass screw at the upper end. The diving-bell is then raised up slowly, and additional tin pipes with brass screws are attached, until the pipes are about two feet above the surface of the water. The man who is to fire the charge is placed in a boat close to the tube, to the top of which a piece of cord is attached, which he holds in his left hand. Having in the boat a brazier with small pieces of iron red hot, he drops one of them down the tube, this immediately ignites the powder, and blows up the rock. A small part of the tube next the cartridge is destroyed; but the greater part, which is held by the cord, is reserved for future service. The workmen in the boat experience no shock; the only effect is a violent ebullition of the water, arising from the explosion; but those who stand on the shore, and upon any part of the rock connected with those blowing up, feel a very strong concussion. The only difference between the mode of blasting rock at Howth and at Plymouth is, that at the latter place they

connect the tin pipes by a cement of white lead. A certain depth of water is necessary for safety, which should not be less than eight or ten feet.—*From the Repertory of Patent Inventions*, No. 97.

XVII. *The Teasel.*—The present season, 1832, has been the most productive in this important article of produce in the West of England ever remembered; and the crops have been gathered in the best possible condition. The Teasel, a species of thistle, (*Dipsacus fullonum*), is propagated by sowing the seeds in March, upon a well prepared soil. About one peck of seed is sufficient for an acre, as the plants must have room to grow, otherwise the heads will not be large enough, nor in great quantity. When the plants come up, they must be hoed in the same manner as practised for turnips, cutting down all the weeds, and thinning the plants to about eight inches distant, and, as they advance, and the weeds begin to grow again, they must be hoed a second time, so that the best plants may finally extend a foot apart. The second year they will shoot up heads, which may be cut about the beginning of August. They are then to be tied up in bunches, and set in the sun, if the weather be fair, or if not, in rooms to dry. The common produce is about 160 bundles or staffs per acre. In Essex, the seeds of the Teasel, caraway, and coriander, are sometimes sown together early in the Spring. The mode of cultivation is rather singular, the farmer engaging with some labourers to share equal profits; the farmer provides the land, ploughs it, pays all parish rates, and also supplies the seed, the latter sows it, keeps it down by frequent hoeings, cuts, thrashes, and prepares it for the market. This connexion generally lasts three years, sometimes longer. Mr Griggs informs us in his General View of the Agriculture of Essex, that "in the first year the several seeds come up, and when of sufficient growth, are set out with the hoe, and the coriander, which is annual, is ripe before harvest, and produces a return from 10 to 14 cwt. per acre; in the second year, the teasel, most of which will run now, yield a load of six score staffs, of 50 heads each staff; and the caraways from 3 to 6 cwt. of seed; the third year the teasel declines, and the caraway is in perfection, and will yield an equal bulk with the coriander of the first year; and most of the teasel that did not run to seed last season, will produce heads this, and afford a fourth or a fifth part of the crops it did the preceding year, by which time the plants are generally exhausted, though a fourth and even a fifth year of caraway has been known to succeed. The coriander and caraway must be handled with great care when ripe. Women and children are generally employed to cut them plant by plant, which are afterwards placed on cloths, and commonly thrashed on sail-cloth, in the field. The teasel is also cut by women, who leave a stalk with the head five or six inches in length, by which it is bound in bunches or gleans of twenty-five heads each; fifty gleans make one staff. The teasel is of singular use in raising the nap upon woollen cloth: for this purpose the heads are fixed round a large broad wheel, which is made to revolve; two men hold the teasel frame as it is called, and work the cloth as it hangs up in a vertical position, drawing it down in portions as they proceed. The whole forms an instrument resembling a curry-comb, and which is used in a similar manner to draw out all loose seeds of the fibres of the wool.—*Repository of Patent Inventions*, No. 95.

XVIII. *The Light of Rushes.*—The proper species of rush for giving light seems to be the *Juncus conglomeratus* or common soft rush, which is to be found in most moist pastures, by the sides of streams, and under hedges. These rushes are in best condition in the height of summer, but may be gathered, so as to serve the purpose well, quite on to autumn. It would be needless to add, that the largest and longest are best. Decayed labourers, women, and children, make it their business to secure and prepare them. As soon as they are cut, they must be flung into water, and kept there; for otherwise they will dry and shrink, and the peel will not run. At first, a person would find it no easy matter to divest a rush of its peel or rind, so as to leave one regular, narrow, even rib from top to bottom, that may support the pith; but this soon becomes familiar even to children; and we have seen old women stone blind, performing this business with great dispatch, and seldom failing to strip them with the nicest regularity. When these rushes are thus prepared, they must lie out on the grass to bleach and take the dew for some nights, and afterwards to be dried in the sun. Some skill is required in dipping these rushes in the scalding fat or grease, but this knack also is to be obtained by practice. The careful wife of an industrious Hampshire labourer obtains all her fat for nothing, for she saves the scummings of her bacon pot for this use; and if the grease abounds with salt, she causes the salt to settle to the bottom by setting the scummings in a warm oven. Where hogs are not much in use, and especially by the sea side, the coarser animal oils will come very cheap. A pound of common grease may be procured for 4d., and about six pounds of grease will dip a pound of rushes, and one pound of rushes may be bought for 1s., so that one pound of rushes dipped and ready will cost 3s. If those who keep bees will mix a little wax with the grease, it will give it a consistency, and render it more cleanly, and make the rushes burn longer; mutton suet would have the same effect. A good rush which measured in length two feet four inches and a half, being minuted, burnt only three minutes short of an hour. These rushes give a good clear light. In one pound of dry rushes which I caused to be weighed and numbered, we found upwards of 1600. Now suppose each of these burns, one with another, only half an hour, then a poor man will purchase 800 hours of light, a time exceeding 33 entire days, for 3s. According to the account, each rush costs one thirty-third of a farthing and one eleventh afterwards. Thus a poor family will enjoy five and a half hours of comfortable light for a farthing. An experienced old house-keeper assures me, that one and a half pound of rushes completely supplied her family the year round, since working people burn no candle in the long days, because they rise and go to bed by day light. Little farmers use rushes much in the short days, both morning and evening, in the dairy and kitchen; but the very poor, who are always the worst economists, and therefore must continue very poor, buy a halfpenny candle every evening, which in their blowing open rooms, does not burn more than two hours. Thus they have only two hours of light for their money instead of eleven.—*White's Selborne.*

XIX. *The Pearl Fishery in Ceylon.*—The country round Aripo, on the south-western coast of the island of Ceylon, is flat, sandy, and barren, presenting nothing to the eye but low brushwood, chiefly of thorns and prickly

pears, and here and there some straggling villages, with a few cocoa-nut trees. But Condaachty, three miles distant, where, in general, nothing is to be seen but a few miserable huts, and a sandy desert, becomes, during the period of the pearl-fishery, a populous town, several streets of which extend upwards of a mile in length, (though, as the houses are only intended as a shelter from the sun and rain, they are very rudely constructed), and the scene, altogether, resembles a crowded fair on the grandest scale. The people most active in erecting huts and speculating in the various branches of merchandise, are Mohammedans, Cingalese (natives of Ceylon), and Hindoos from the opposite coast of the continent of India. Apparently, however, from their natural timidity, none of the Cingalese are divers, and scarcely any of them engage in the other active parts of the fishery; they merely resort hither for the purpose of supplying the markets. About the end of October, in the year preceding a pearl-fishery, when a short interval of fine weather prevails, an examination of the banks takes place. A certain number of boats, under an English superintendent, repair in a body to each bank, and having, by frequent diving, ascertained its situation, they take from one to two thousand oysters as a specimen. The shells are opened, and if the pearls collected from a thousand oysters be worth L.3 Sterling, a good fishery may be expected. The "banks," or beds of oysters, are scattered over a space in the gulf of Manaar, extending thirty miles from north to south, and twenty-four from east to west. There are fourteen beds (not all, however, productive), of which the largest is ten miles long, and two broad. The depth of water is from three to fifteen fathoms. The pearl-oysters in these banks are all of one species, (the *Meleagrina margaritifera* of Lamarck), and of the same form in shape not very unlike our common English oyster,—but considerably larger, being from eight to ten inches in circumference. The body of the animal is white, fleshy, and glutinous; the inside of the shell (the real "mother-of-pearl"), is even brighter and more beautiful than the pearl itself; the outside smooth and dark coloured. The pearls are most commonly contained in the thickest, and most fleshy part of the oyster. A single oyster will frequently contain several pearls, and one is on record, as having produced 150. The pearl itself is probably the result of some accidental deposit or extravasation of the liquor secreted by the animal, in the gradual enlargement of its shell,—very small in the first instance, but increased by successive layers of pearly matter. Sometimes the English government of Ceylon fishes the banks entirely at its own risk; sometimes the boats are let to many speculators, but most frequently the right of fishing is sold to one individual, who sublets boats to others. The fishery for the season of the year 1804, was set by government to an individual for no less a sum than L. 120,000. At the beginning of March, the fishery commenced, and upwards of two hundred and fifty boats were employed in the fishery alone. These, with their crews and divers, and completely equipped with every thing necessary to conduct the business of the fishing, come from different parts of the coast of Coromandel. After going through the various ablutions and incantations, and other superstitious ceremonies, the occupants of these boats embark at midnight, guided by pilots, and as soon as they reach the banks, they cast anchor, and wait the dawn of day. At about seven in the morning, when the rays of the

sun begin to emit some degree of warmth, the diving commences. A kind of open scaffolding, formed of oars and other pieces of wood, is projected from each side of the boat, and from it the diving-tackle is suspended, with three stones on one side, and two on the other. The diving-stone hangs from an oar by a light rope and slip knot, and descends about five feet into the water. It is a stone of fifty-six pounds weight, of a sugar-loaf shape. The rope passes through a hole in the top of the stone, above which a strong loop is formed, resembling a stirrup-iron, to receive the foot of the diver. The diver wears no clothes, except a slip of calico round his loins,—swimming in the water, he takes hold of the rope, and puts one foot into the loop or stirrup, on the top of the stone. He remains in this upright position for a little while, supporting himself by the means of one arm. Then a basket, formed of a wooden hoop and net-work, suspended by a rope, is thrown into the water to him, and in it he places his other foot. Both the ropes of the stone and the basket he holds for a little in one hand. When he feels himself properly prepared and ready to go down, he grasps his nostrils with one hand, to prevent the water from rushing in; with the other gives a sudden pull to the running-knot suspending the stone, and instantly descends; the remainder of the rope fixed to the basket is thrown into the water after him, at the same moment; the rope attached to the stone is in such a position as to follow him of itself. As soon as he touches the bottom, he disentangles his foot from the stone, which is immediately drawn up, and suspended again to the projecting oar in the same manner as before, to be in readiness for the next diver. The diver arrived at the bottom of the sea, throws himself as much at possible upon his face, and collects every thing he can get hold of into the basket. When he is ready to ascend, he gives a jerk to the rope, and the persons in the boat, who hold the other end of it, haul it up as speedily as possible. The diver, at the same time, free of every incumbrance, warps up by the rope, and always gets above water a considerable time before the basket. He presently comes up at a distance from the boat, and swims about, or takes hold of an oar or a rope, until his turn comes to descend again; but he seldom comes into the boat, until the labour of the day is over. When a young diver is training to the business, he descends in the arms of a man completely experienced in the art, who takes great care of him, and shows him the manner of proceeding, and the pupil at first brings up in his hand a single oyster, a stone, or a little sand, merely to shew that he has reached the bottom. The length of time during which the divers remain under water, is rarely much more than a minute and a half; yet in this short period, in a ground richly clothed with oysters, an expert diver will often put as many as one hundred and fifty into his basket. There are two divers attached to each stone, so that they go down alternately; the one rests and refreshes, while the other plunges. The men, after diving, generally find a small quantity of blood issue from their nose and ears, which they consider as a favourable symptom, and perform the operation with greater comfort after the bleeding has commenced. They seem to enjoy the labour as a pleasant pastime, and never murmur or complain, unless when the banks contain a scarcity of oysters, though their labours are continued for six hours. When the day is sufficiently advanced, the head pilot makes a signal, and

the fleet set sail for the shore. All descriptions of people hasten to the water's edge to welcome their return, and the crowd, stir, and noise are then immense. Every boat comes to its own station, and the oysters are carried into certain paved enclosures on the sea-shore, where they are allowed to remain in heaps, (of course well guarded), for ten days, that time being necessary to render them putrid. When the oysters are sufficiently decayed, they are thrown into a large vessel filled with salt water, and left there for twelve hours to soften their putrid substance. The oysters are then taken up, one by one, the shells broken from one another, and washed in the water. Those shells which have pearls adhering to them are thrown on one side, and afterwards handed to clippers, whose business it is to disengage the pearls from the shells, with pincers. When all the shells are thrown out, the slimy substance of the oysters remains, mixed with sand and broken fragments of shells, at the bottom of the vessel. The dirty water is lifted out in buckets, and poured into a sack made like a jelly-bag, so that no pearls can be lost. Fresh water being then added from time to time, and the whole substance in the vessel continually agitated, the sand and pearls together are by degrees allowed to sink to the bottom. As soon as the sand is dry, it is sifted; the large pearls being conspicuous, are easily gathered; but the separating the small and diminutive ("seed pearls" as they are called), is a work of considerable labour. When once separated from the sand, washed with salt water, dried, and rendered perfectly clean, they are sorted into classes according to their sizes, by being passed through sieves. After this, a hole is drilled through each pearl; they are arranged on strings, and are then fit for the market. Pearls have been considered as valuable ornaments from the earliest times: they are mentioned in the book of Job (xxviii. 18), and are often alluded to by the classical writers. There have been various attempts made to imitate them successfully, one of the most singular of which, —known to have been practised early in the Christian æra, on the banks of the Red Sea,—is still carried on in China. A hole is bored in the shell of the pearl-oyster, a piece of iron-wire inserted, and the oyster restored to its place: the animal, wounded by the point of the wire, deposits a coat of pearly matter round it; this gradually hardens, successive layers are added till a pearl of the requisite size is formed, and the shell is once more brought to land. False pearls are made of hollow glass globules, the inside of which is covered with a liquid, called pearl-essence, and then filled with white wax. This liquid is composed of the silver-coloured articles which adhere to the scales of the Bleak (Ablette), and was first applied to this purpose early in the last century by a Frenchman of the name of Jacquin. In the year 1761, Linnæus discovered the art by which the muscles which are found in many of our rivers might be made to produce pearls: but we believe it has never been made public. The muscles found in the river Conway, in Wales, and in some of the rivers of Scotland, have not unfrequently produced large and fine-coloured pearls. F. E. P.—*Abridged from Cordiner's History of Ceylon.*

XX. *Stuffed Animals.*—M. Laurent, a distinguished French naturalist, recommends the following composition, after ten years' experience, for preserving the skins of stuffed animals. He observes, at the same time, that it pe-

ıtes them with greater readiness, and preserves them much better than preparation which has hitherto been in use: Arseniate of potash, sulphate ımine, and camphor powdered, 2 dr. each; white soap in powder, ½ oz.; :s of wine, 6 oz.; essence of thyme, 30 drops. The arseniate, sulphur, ıhor, and soap, are to be placed in a phial with a large mouth, and the spi- ıf wine to be poured upon them at 25°. They will be perfectly com- l in 24 hours' time, when the essence of thyme is to be added, and then ıhial is to be carefully corked down. This composition is to be shaken :her before it is made use of, and it is to be spread over the coat of the al with a brush.

XI. *Dolls' Eyes.*—The following abstract from the evidence given before a mittee of the House of Commons, on the Report on Artizans and Ma- :ry, shows the extent to which articles apparently the most insignificant, ɔnsumed, and the view which the manufacturer takes of them. The person ıined on the occasion was Mr Ostler, a manufacturer of glass-beads and : toys of the same substance, from Birmingham. Several articles made by were placed upon the table for the inspection of the Committee. *Quest.* "Is ? any thing else you have to state on this subject?" *Ans.* "Gentlemen consider the articles on the table as extremely insignificant, but perhaps y surprise them a little by mentioning the following fact. Eighteen ; ago, on my first journey to London, a respectable-looking man in the asked me if I could supply him with dolls' eyes; and I was foolish gh to feel half offended; I thought it derogatory to my new dignity as a ıfacturer to make dolls' eyes. He took me into a room quite as wide, ɔerhaps twice the length, of this committee-room, and we had just room ılk between stacks, from the floor to the ceiling, of parts of dolls. He 'These are only the legs and arms; the trunks are below.' But I saw gh to convince me, that he wanted a great many eyes; and as the article ıred quite in my own line of business, I said I would take an order by of experiment; and he showed me several specimens. I copied the order. rdered various quantities, and of various sizes and qualities. On return- ɔ the Tavistock hotel, I found that the order amounted to upwards of). I went into the country, and endeavoured to make them. I had of the most ingenious glass-toy makers in the kingdom in my service; ?hen I shewed it to them, they shook their heads, and said they had often the article before, but could not make it. I engaged them, by presents, e their best exertions; but after trying, and wasting a great deal of time ıree or four weeks, I was obliged to relinquish the attempt. Soon after- ; I engaged in another branch of business (chandelier furniture), and no more notice of it. About eighteen months ago I resumed the trinket , and then determined to think of the dolls' eyes; and about eight months , I accidentally met with a poor fellow, who had impoverished himself inking, and who was dying of a consumption, in a state of great want. wed him ten sovereigns, and he said he would instruct me in the pro- He was in such a state that he could not bear the effluvia of his own ; but though I was very conversant with the manual part of the business, t related to things I was daily in the habit of seeing, I felt I could learn ng from his description. (I mention this to show how difficult it is to

convey, by description, the mode of working.) He took me into his garret, where the poor fellow had economized to such a degree, that he actually used the entrails and fat of poultry from Leadenhall market, to save oil (the price of the article having been latterly so much reduced by competition at home). In an instant, before I had seen him make three, I felt competent to make a gross; and the difference between his mode and that of my own workmen was so trifling, that I felt the utmost astonishment." *Quest.* "You can now make dolls' eyes?" *Ans.* "I can. As it was eighteen years ago that I received the order I have mentioned, and feeling doubtful of my own recollection, though very strong, and suspecting that it could not have been to the extent stated, I last night took the very reduced price of that article (less than half now of what it was then), and calculating that every child in the country not using a doll till two years old, and throwing it aside at seven, and having a new one annually, I satisfied myself that the eyes alone would produce a circulation of a great many thousand pounds. I mention this merely to show the importance of trifles; and to assign one reason, amongst many, for my conviction, that nothing but personal communication can enable our manufactures to be transplanted."—*Babbage on the Economy of Machinery and Manufactures.*

XXII. *The Jew's Harp.*—Mr C. Eulenstein, a German we may be certain, for the German musicians are musical philosophers, has improved this simple toy; first, by adding a small bulb of wax to the end of its tongue, which renders it capable, by presenting an expanded surface to the action of the air, of being almost moved by air to sound, certainly of retaining the impulse given by the finger longer, and thus of prolonging the sound. His next improvement is that of an additional tongue, which may be tuned a perfect, and imperfect chord, or a discord. The miracle is the extreme ingenuity displayed by this gentleman in its application to his art, which is no less than that of performing preludes of deep harmony, and airs with their moving accompaniments, either adagio or prestissimo. His chromatic division of the scale, and the shake he produces, are delightful; he is not only a musician, but he possesses a most exquisite taste. He selects from his box a number of these harps, single-tongued; some of which are sevenths and chromatics to the tonic, and its domitant, of the air he is about to perform; and thus he produces his modulations; by occasionally using two double-tongued harps, the triad, with its octavo, or its flat seventh, are obtained. The rising and dying swell of the full harmony is enchanting. The twang usually produced by the impulse of the finger is not perceptible, as he strikes the tongue at intervals between the phrases of his melody; and he changes the various harps so adroitly that no pause occurs in the performance until its close; in short, long practice has given him so perfect a command of his little orchestra, that he may be pronounced a finished performer. The musical snuff-box is constructed on the principle of this instrument, its bars or springs being screwed to its metal 'sounding board" (if we may say so, for the purpose of making ourselves better understood), are rendered more audible; but the sounds of the harp, being sustained, have a fuller and richer tone, as much excelling those of the snuff-box, as do the violins the guitars. Besides being moved by the mechanism of wind, they triumph in expression over that of mere machinery.—*Athenæum.*

XXIII. *The Chiragon or Guide for the Hand.*—Mr William Stidolph, a schoolmaster at Blackheath, has invented an apparatus, to which the name of Chiragon is given; by the assistance of which, a person who has become blind, after having learned the art of writing, may continue its practice, without the risk of confounding words or lines together. It consists of a frame with a raised margin, upon which margin is placed a narrow piece of wood, having a groove to receive a corresponding key that is attached to a bracelet for the wrist. In the sides of the frame, a series of notches are cut, into which the grooved piece of wood is placed, successively, so as to form the regular intervals between the lines, whilst the hand is permitted by the bracelet to pass freely from left to right, but is confined to certain limits in its action up and down, or in the direction of the paper used. The writing is effected with Mordant's patent pencils; and we have proved the efficiency of the invention by writing a letter with its guidance, while our eyes were bandaged so as to exclude the light of every object.—*Athenæum.*

QUARTERLY AGRICULTURAL REPORT.

August 1833.

SINCE our last report, the weather has presented two extraordinary anomalies. May was perhaps the hottest and June the coldest, within the recollection of most people. In May there were 286 hours of sunshine; that is, a daily average of 9 hours 13 minutes and 32½ seconds, being 74 hours more than in May last year. In June there were only 191 hours, or 6 hours 22 minutes daily. This order of things, to be seasonable, should have been reversed. This extraordinary state of the weather was injudiciously felt throughout Europe. All the crops on light soils have suffered from the heat and drought in May, and the more advanced they were, the less benefit they derived from the rains in June and July. We cannot from experience yet give an account of the probable produce of the crop which is just reaping. Judging from its appearance on the ground, we would say that the Wheat is rather thin, though the ears are large and quite full. The heavy rains in July has prevented it ripening quickly on damp soils, but a little sun and warmth would produce a plump golden-coloured sample. After a personal inspection of twelve of the agricultural counties in Scotland, we would pronounce the crop of wheat an average one. There have been few complaints of the ravages of the fly this year. The warm weather in May had probably produced the winged insect before the plant was ready as a depository for its eggs. Barley is about an average crop; notwithstanding its thinness on the ground, the ears are remarkably long. Such samples as we have seen of this grain, are

plump, fine coloured, and heavy, 57 lb. per bushel. Barley we believe always weighs heavier out of the stook than the stack, which proves that it dries without shrinking. Some barley of a new variety, called Chevalier barley, grown by Mr Dunlop, Linton in East Lothian, presents the most beautiful sample we ever saw. Oats will certainly not be a bulky crop, though it will be an average one. In the more elevated districts, however, it will probably be above an average both in grain and straw. In those districts it will be late, though there is yet little danger to be apprehended from frost. The same breadth as usual has not been sown with Beans, owing to the wet spring. The straw is short, though the pods are thickly set and full of produce. The crop of Peas on all friable lands will be a heavy one, but rather stinted on clay soils. The Potatoes assumed an alarming appearance in brairding. Some of the seed did not vegetate at all, while others came up in a straggling manner. What had been planted at one period of the day came up well, while that at another period never made its appearance. This extraordinary phenomenon occurred over the United Kingdom: It has hitherto been unexplained. Some ascribe it to the heating of the seed, by being kept in heaps, others to the heat of the weather in May. But seed had been kept in heaps by some without injury; and the mere heat of the sun could not destroy vitality in the seed lying in the earth, otherwise the whole seed would have thus been killed. Besides potato seed is not injured by being dried *. The crop is now much improved, and will be on the whole an average one. On very dry land, they are in want of rain, and on heavy clay soils they are spindly in the stems, and will be an inferior crop. In some of the higher districts they received a check by the frost in the evening of the 6th August. In all heavy stiff soils, in short in all soils unsuited to the turnip, Turnips appear shy and even blanky, and from every appearance at present the produce will be short. But we would never despair of a turnip crop till after the middle of October, as they make the greatest progress in September and October. On all friable lands, and even in the highest districts of the country, they are healthy, and already have met in the drills, and will be a good crop. The markets in the south for Cattle are a shade lower, but at Falkirk market lately, they fully maintained their prices. The

* Gardeners allege that potatoes are injured for seed by being kept too long in the pit. If so, as the crop of potatoes last year was early taken out of the ground, and the seed-time this year was unusually late, might not the long confinement in the pit have injured the vegetative powers of the potato-seed?

prices of fat Sheep are still very high, both for Ewes and Wedders, they may be stated at 5s. a-head above the last year's prices. The demand for Lambs of every description has been very great at all the fairs, and ready sales have been effected at advanced prices. Cheviot and black-faced lambs are from 2s. to 2s. 6d.; and half-bred and full-bred lambs from 3s. to 4s. 6d. a-head above the last year's prices. Some lots of the best bred Leicester wedder lambs fetched, at Yetholm fair, on 5th July, 26s. a-head. What renders them still higher priced is, that lambs are small in size this year, and those from the higher grounds are not fit for the butcher.—The demand this season for Wool, of all kinds, and particularly for the combing, is extraordinary. We may say that the whole stock has already passed from the hands of the wool-growers, and at high prices, in some instances 35s. per stone of 24 lb. for mixed Leicester ewe and hogg, and generally 30s., and for hogg alone 36s., being about 20 per cent. above last years' prices. This great rise of price may be partly accounted for from the scarcity of wool in the German markets. According to the German papers, only 12,000 stones were produced at Leipsic fair, on the 15th June, instead of 40,000 or 50,000. The whole of this deficiency did not arise, however, from the scarcity of the article, as many of the wool growers sold their wool on their farms, and not in the market. The real cause of the scarcity may be ascribed to the unfavourable weather for the flocks which occurred last year, and the mortality and consequent diminution of supply thereby occasioned; to which must be added, the diminished weight of the clip, occasioned by the mild winter of last year, and the bad weather at the clipping season. But the Germans ascribe the main impulse on their prices to have arisen from England, where the modification of the American Tariff has had a favourable influence on the manufactures of Yorkshire and the West of England. The American shipping will now carry English woollen goods to China to exchange for tea.—The pastures look well, and afford a full bite, and the grazing stock is consequently in fine condition. The dry weather in May diminished the bulk of the hay crop, but hay is, nevertheless, very cheap, not exceeding 6d. per stone of 22 lb.—The grain markets have continued very depressed during the quarter, the aggregate average of the kingdom in the last week of July for wheat being only 54s. 6d., the deviation in the price of wheat for the last six months not having exceeded, in any one instance, above 4s. 3d. per quarter. This steadiness of price shows, if any thing can show it, that a cessation in the speculation of foreign corn is accompanied with a remarkable steadiness in the prices of grain in our home markets.

We gave Earl Fitzwilliam's resolutions on the Corn Laws in our last report. Since then an unavailing discussion on them took place in the House of Lords. On the 17th May Mr Whitmore, one of the Members for Wolverhampton, produced these resolutions, on the same subject, in the House of Commons :—" 1st, That the present system of corn laws, founded on a high and ever-varying scale of duties, while it fails of conferring permanent benefit on the agricultural interest, tends to cramp the trade, and impair the general prosperity of the country. 2d, That an alteration of these laws, substituting in their stead a moderate duty, fixed at all periods except those of extreme dearth, while it indemnified the agriculturists for the peculiar burdens which press upon them, would, by restoring the commercial relations between this kingdom and foreign countries, increase the manufactures, and render the price of the produce of the country more equal." And Mr Fryer, the colleague of Mr Whitmore, went a little farther, and made a motion, on the 18th June, to repeal the present corn laws. These three gentlemen belong to the same school of political economists. They are all so enamoured of the beauties of free trade, that any corn which comes not into this country free of duty, is odious in their sight. Were the duty but taken off imported corn, the bread which our labourers of all descriptions eat, would soon make them plump and sleek with fatness, but so long as a sum is imposed on corn as a protecting duty, these same labourers, while eating the same bread, are, to the jaundiced vision of these legislators, in a state of actual starvation! Free trade, cry they, and the " sweet voices " of the rabble echo free trade. But though Lord Ripon innocently asks them what is free trade, none of them can answer the question aright. They all admit that a " moderate duty " is necessary to be exacted on imported corn for the sake of our agriculturists. Why? Is it consistent, to say that a duty on corn is necesary, and at the same time to declare that a want of freedom in its trade starves our own, and prevents foreign labourers being properly clothed? But the necessity of a " moderate duty," is only admitted because this country is taxed to a greater degree than others. If they mean that the burden of the national debt is the great cause of taxation in this country, we say these legislators work the wrong way to get quit of the corn laws. Had they legislated as able national financiers, they would by this time have reduced, with the means already prepared for them, the greatest portion of the public debt, and the operation of the same means would soon have liquidated it altogether. If it were liquidated, we are sure our agriculturists would compete successfully against the whole host of serfs and boors on the Continent

without any protecting duty. Since, then, it is admitted that our agriculturists are peculiarly burdened, it would surely display more wisdom and humanity to lift that burden off their backs, in order to relieve them, than to push them down along with the burden. Let these legislators first display wisdom in the management of the finances of the country, and we will then have more confidence in their plans for improving the condition of the working classes.

We observe that a bill has been prepared to legalise the sale of corn by weight throughout the kingdom, but which has been withdrawn for the present. We have seen a draft of the bill in Dimsdale's Universal Corn Reporter, and if we understand the meaning of the second clause, it proposes to establish a given weight of corn for a given bulk as the standard value. If weight alone irrespective of bulk, is to be the standard of value, we decidedly object to the bill being passed into law. No one can form an idea of the quality of a hundred-weight of wheat, barley, or oats, whether that hundred-weight is composed of the winnowings or of the good grains themselves, until the grain is exhibited. But every one can understand that a bushel of wheat weighing 63 lb. is of finer quality, and is worth more money than a bushel weighing only 50 lb. or 57 lb. We do not mean to insinuate that people should buy grain without seeing it, but it is evident, when weight and measure are both mentioned, the quality of the grain can be pretty well understood without inspection. Weight and measure combined present a simpler means of judging of the quality of grain than weight or measure taken separately. All corn in Scotland is sold by weight *and* measure; the measure being an invariable quantity, the weight regulates the price. Let Mr Vernon's bill be founded on this principle, and it shall have our cordial approbation. Any other principle will never receive the support of the farmer, corn-dealers, and clergy of Scotland. No one who has seen the filthy rubbish sold by weight in the corn-markets in Ireland, should recommend a similar practice to be introduced into this country.

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
May 3.	53 9	26 4	17 10	32 0	32 0	31 7
10.	54 4	27 5	18 1	31 6	31 6	32 1
17.	56 1	26 4	18 4	31 10	31 10	31 4
24.	55 3	25 4	19 1	30 9	32 2	32 2
31.	55 7	26 4	18 9	31 9	32 8	31 4
June 7.	54 3	26 2	19 7	32 3	33 6	32 10
14.	54 7	25 9	20 10	32 8	33 8	33 1
21.	56 4	26 10	21 8	33 2	34 2	36 0
28.	57 5	28 1	20 6	32 8	34 2	36 9
July 5.	57 4	28 0	20 2	33 0	35 6	34 10
12.	54 8	27 3	19 0	33 6	36 9	34 6
19.	56 5	26 7	19 9	32 8	33 6	33 10
26.	57 0	27 2	20 0	33 0	39 6	34 2

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Fla Per 9 S
1833.	s. d.	s. d.	s. d.	s. d.	s.
May 4.	27 0	12 2	10 4	8 5	15
11.	28 4	12 5	10 6	8 6	15
18.	28 4	12 9	10 2	8 6	16
25.	27 11	12 7	10 8	8 11	16
June 8.	28 0	13 0	10 0	9 5	16
15.	27 8	13 4	10 6	9 7	16
22.	27 7	13 6	10 6	9 1	15
29.	28 8	13 6	10 2	9 2	16
July 6.	28 8	14 0	10 8	9 7	16
13.	29 0	14 2	10 6	9 10	16
20.	30 8	14 6	10 2	10 7	16
27.	30 6	14 0	10 0	10 6	16
Aug. 3.	30 6	14 0	10 0	10 0	16

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
May 6.	49 7	27 6	16 7	31 2	30 6	32 10
13.	50 7	24 8	17 0	31 0	30 0	31 5
20.	50 7	26 8	17 5	31 6	30 6	34 6
27.	50 9	31 5	17 3	30 8	31 2	34 2
June 4.	51 3	28 6	17 2	30 11	30 2	32 3
11.	50 9	25 11	17 1	31 10	31 6	32 0
18.	51 8	26 0	16 8	31 2	32 4	33 8
25.	48 10	25 8	17 0	31 4	32 10	32 6
July 2.	50 10	26 6	17 3	30 9	33 6	33 8
9.	51 7	26 5	17 8	31 8	35 6	34 4
16.	51 4	24 9	17 11	32 0	37 6	35 3
23.	51 6	25 6	18 3	31 4	38 0	36 0
30.	52 0	26 0	18 9	31 8	39 0	37 0

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.	Bea
1833.	s. d.	s. d.	s. d.	s. d.	s.
May 8.	57 6	29 0	21 1	29 0	29
15.	58 3	29 6	19 11	29 0	29
22.	58 6	28 6	19 4	28 6	28
29.	58 2	28 10	19 6	27 6	27
June 5.	58 4	29 6	20 3	29 0	29
12.	56 2	29 10	20 6	29 0	29
19.	54 0	28 0	20 10	28 6	29
26.	54 6	28 6	19 8	28 0	28
July 3.	54 4	28 9	20 2	29 0	29
10.	55 6	29 0	20 3	30 0	30
17.	55 8	29 0	20 2	30 6	31
24.	57 6	29 6	20 3	30 6	31
31.	54 6	29 0	19 4	30 6	31

TABLE showing the Weekly Average Prices of GRAIN, made up in terms of 7th and Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN CORN ; the Duties payable thereon, from 1st May to 1st August 1833.

Date.	Wheat.			Barley.			Oats.			Rye.			Pease.			Beans		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
May 3.	53 5	53 5	33 8	25 10	26 5	22 10	17 0	16 11	22 9	31 2	31 7	22 9	29 6	31 4	22 9	30 5	30	
10.	53 8	53 6	33 8	25 9	26 2	22 10	17 1	16 11	22 9	31 0	31 5	22 9	29 10	30 11	24 3	30 11	30	
17.	54 1	53 6	33 8	24 11	25 10	22 10	17 2	17 0	21 3	32 6	31 4	22 9	31 1	30 8	24 3	30 11	30	
24.	53 6	53 6	33 8	24 8	25 7	22 10	17 8	17 1	21 3	29 8	31 2	22 9	30 5	30 5	24 3	31 8	30	
31.	53 7	53 6	33 8	24 6	25 3	24 4	17 7	17 2	21 3	32 9	31 1	22 9	31 3	30 5	24 3	31 3	30	
June 7.	52 10	53 6	33 8	24 6	25 0	24 4	18 1	17 5	21 3	30 1	31 1	22 9	32 5	30 10	24 3	31 11	31	
14.	52 9	53 5	33 8	24 5	24 9	25 10	18 8	17 8	21 3	32 11	31 5	22 9	33 10	31 6	22 9	32 5	31	
21.	53 1	53 3	33 8	25 6	24 9	25 10	19 0	18 0	19 9	30 4	31 4	22 9	33 8	32 0	21 3	32 2	31	
28.	54 4	53 4	33 8	26 10	25 1	24 4	19 3	18 4	19 9	32 7	31 4	22 9	36 2	32 9	21 3	34 5	32	
July 5.	54 7	53 6	33 8	26 4	25 4	24 4	19 1	18 7	19 9	32 10	31 11	22 9	37 9	34 0	18 3	33 11	32	
12.	54 1	53 7	33 8	25 6	25 6	24 4	18 8	18 10	19 9	32 9	31 11	22 9	38 4	35 1	16 9	34 6	33	
19.	54 8	53 11	33 8	26 0	25 9	24 4	19 2	19 0	18 3	29 6	31 10	22 9	39 0	36 2	15 6	34 2	33	
26.	56 4	54 6	32 8	25 11	26 0	22 10	19 2	19 1	18 3	32 7	31 9	22 9	40 0	37 3	14 6	34 1	34	

MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities o Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantiti upon which duties have been paid for home-consumption, during the same Month; and the Quan tities remaining in Warehouse at the close thereof: from 1st May to 1st July 1833.

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
3. ith ing	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
l.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. B
, . .	3,282 6	152 1	3,434 7	11 0	1,095 5	1,106 5	511,684 4	12,785 2	524,469
. .	96 3	..	96 3	..	..	..	16,038 6	..	16,038
. .	..	..	..	15 0	..	15 0	209,350 3	..	209,350
. .	..	..	..	..	..	..	4,724 5	..	4,724
. .	4 7	..	4 7	..	..	..	1,885 1	..	1,885
. .	..	..	..	..	..	..	20,474 3	..	20,474
als, .	3,384 0	152 1	3,536 1	26 0	1,095 5	1,121 5	764,107 6	12,785 2	776,893
l.									
, . .	22,504 0	1,006 5	23,510 5	8 4	1,649 5	1,658 1	524,912 2	12,017 1	536,929
. .	..	..	..	..	..	..	16,471 0	..	16,471
. .	570 4	..	570 4	29 4	..	29 4	207,749 6	..	207,749
. .	..	..	..	..	..	..	5,059 0	..	5,059
. .	538 4	0 2	538 6	0 1	0 2	0 3	2,331 0	..	2,331
. .	1,252 1	..	1,252 1	..	..	..	21,726 4	..	21,726
als, .	24,865 1	1,006 7	25,872 0	38 1	1,649 7	1,688 0	778,249 4	12,017 1	790,266
l.									
, . .	20,158 3	5,275 1	25,433 4	13 0	5,237 5	2,250 5	546,168 2	11,109 5	557,277
. .	988 3	..	988 3	..	..	..	17,414 1	..	17,414
. .	53 0	..	53 0	..	..	..	207,110 5	..	207,110
. .	6 6	..	6 6	..	..	..	5,065 6	..	5,065
. .	804 6	..	804 6	..	..	..	3,082 6	..	3,082
. .	1,094 0	..	1,094 0	..	..	..	22,820 4	..	22,820
als, .	23,105 2	5,275 1	28,380 3	13 0	5,237 5	5,250 5	801,662 0	11,109 5	812,771

	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
3. ith ing	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
l.	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	wt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr.
. .	291 2 17	175 0 21	466 3 10	25 2 23	1,349 0 13	1,374 3 8	507,062 3 15	20,594 2 0	527,607 1
al, .	..	..	..	..	..	..	..	82 2 11	82 2
als, .	291 2 17	175 0 21	466 3 10	25 2 23	1,349 0 13	1,374 3 8	507,062 3 15	20,607 0 11	527,689 3
l.									
. .	6,820 0 1	5,884 3 1	12,704 3 2	45 0 12	2,451 1 27	2,696 2 11	478,942 3 27	23,436 1 1	502,379 1
al, .	..	..	..	..	..	..	..	82 2 11	82 2
als, .	6,820 0 1	5,884 3 1	12,704 3 2	45 0 12	2,452 1 27	2,696 2 11	478,942 3 27	23,518 3 12	502,461 3
l.									
. .	956 1 9	8,959 2 0	9,915 3 9	291 3 14	10,721 3 25	11,013 3 11	462,303 1 17	21,848 3 4	484,152 0
al, .	..	..	..	..	..	..	..	82 2 11	82 2
als, .	956 1 9	8,959 2 0	9,915 3 9	291 3 14	10,721 3 25	11,013 3 11	462,303 1 17	21,931 1 15	484,234 3

PRICES of BUTCHER-MEAT.

	Smithfield, *Per Stone of* 14 lb.		Morpeth, *Per Stone of* 14 lb.		Edinburgh, *Per Stone of* 14 lb.		Glasgow, *Per Stone of* 14 lb.	
Date.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
May	6/6 @ 7/3	6/6 @ 7/6	6/3 @ 7/3	6/6 @ 7/6	6/6 @ 7/6	6/6 @ 7/3	6/9 @ 7/9	6/9 @ 7/6
June	6/9 7/6	7/ 8/	6/6 7/6	6/9 7/6	6/ 7/	6/ 7/3	6/6 7/6	6/9 7/6
July	7/ 8/3	7/ 8/	6/9 7/9	6/9 7/9	6/6 7/6	6/9 7/6	6/9 7/6	6/9 7/6

PRICES of English and Scotch WOOL.

English, per 16 lb.—*Merino*, Washed, 28/ @ 32/; in Grease, 18/ @ 23/.—*South Down*, 19/ @ 24/; *Leicester*, 20/ @ 23/6; Ewe and Hogg, 18/ @ 21/.—Ewes, 16/6 @ 19/.—*Locks*, 13/ @ 16/; *Moor*, Ewe and Hogg, 11/6 @ 12/6.

Scotch, per 24 lb.—*Leicester*, 32/ @ 36/; Ewe and Hogg, 28/ @ 30/.—Ewe, 24/ @ 26/.—*Cheviot*, White, 28/ @ 32/; Washed, 18/ @ 21/; Laid, 14/ @ 16/.—*Moor*, White, 15/ @ 16/6; Laid, 12/6 @ 13/6.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of July 1832, *and 5th of July* 1833, *showing the Increase and Decrease on each head thereof.*

	Quarters ended July 5.		Increase.	Decrease.	Years ended July 5.		Increase.	Decrease.
	1832.	1833.			1832.	1833.		
	£	£	£	£	£	£	£	£
Customs, . .	3,515,589	3,663,002	147,733	..	14,844,911	15,633,687	818,776	..
Excise, . . .	3,320,335	3,204,855	..	183,740	14,658,716	14,439,836	..	218,880
Stamps, . . .	1,615,943	1,657,810	42,367	..	6,395,072	6,475,835	..	119,237
Post Office,	304,000	345,000	41,000	..	1,346,000	1,362,000	16,000	..
Taxes, ...	1,934,510	1,921,665	..	12,845	4,905,941	4,991,010	85,069	..
Miscellaneous,	8,581	9,215	,634	..	52,319	69,824	17,505	..
			231,734	196,585			937,350	338,117
	Deduct Decrease, . .		196,585		Deduct Decrease, .		338,117	
	Increase on the quarter,		35,349		Increase on the year,		599,233	

FOREIGN CORN MARKETS.

The low prices of corn in our home markets during the last quarter have had a corresponding depressing effect on the foreign markets. The importation of all kinds of foreign corn during that time has not exceeded 57,788 quarters, 4 bushels. The quantity entered for home-consumption, and which has of course paid the duty, is only 5060 quarters 2 bushels; while the quantity remaining in bond on the 1st July was 812,788 quarters 4 bushels. The quantity of flour and meal of all kinds in bond at that date was 484,234 cwt. 3 qrs. and 4 lb.; the quantity imported during the quarter being only 23,087 cwt. 1 qr. 19 lb. and that entered for home-consumption 15,085 cwt. 1 qr. 2 lb. These statements prove how little has been done in the foreign trade since the date of our last report. Instead of quoting prices, we think we shall interest our reader more with accounts of the state of the crops abroad.

"Kiel, 30th *May*.—The corn trade on the continent has been for a long time in such a state of inactivity, and the interest it usually excites so totally suspended, that we have not troubled you with a report this year. Now, however, that the attention is drawn to the approaching harvest throughout

Europe, we doubt not that a brief statement of the appearance of the growing crops of this country will be acceptable. We had, upon the whole, a mild winter; but the want of rain was felt in exposed situations: our spring was dry and cold, until the beginning of May, when the weather suddenly changed to extreme heat, which has prevailed during the present month; within the last few days we have had a transition to cold, but little rain has fallen. Wheat stood the winter well; and although the ungenial spring prevented its becoming very luxuriant, it looks healthy and promises a fair crop. Rye suffered more than wheat from the bare frost, and subsequently from the drought; in general it is thin and weak, and we anticipate another short crop of this grain. The weather was very favourable to the sowing of barley and oats, which now cover the ground well; the want of moisture, however, begins to show itself on the lighter fields, and if rain does not soon come to their relief, they will suffer seriously and irretrievably."

"ANTWERP, *26th June.*—In the beginning of May the appearance of the wheat crop was very fine, and the farmers rejoiced themselves in the dry weather; but already, three weeks ago, it was noticed, that in the light soils the drought was very prejudicial, and since a few days, the evil has extended itself to our best heavy soils, and the crop is so far advanced, that the rain can do very little if any good at all. We cannot expect more than two-thirds, or perhaps only half of an average crop of wheat. Rye, from the beginning of the season, a very thin crop, and cannot be estimated at more than two-thirds of an average; it has not improved, and can hardly produce so much. Winter barley is a bad crop, estimated at one-half of an average; and summer barley may be considered a failure. Oats look very miserably, but some heavy rain might yet mend them partly, but the crop will not yield more than half an average. Beans are also very bad, and are no more than 12 inches high, and are already in the flower."

"KIEL, *18th July.*—Since our report of the 30th May, the weather has been upon the whole very favourable for crops of every description. The consequence is, that spring corn, which in the beginning of June had assumed a sickly appearance, has since rallied, and now promises a fair return. The rains have been heavier than might have been wished, as respects some of the rank wheats, but as yet they have not done any material damage. Our present prospects therefore are, that wheat will be a full crop; oats and barley short in straw, but tolerably rich in grain; beans, peas, and buckwheat abundant."

"DANZIG, *31st July.*—There is now a complete pause in our markets; holders would give way a certain degree, but the Commission-houses are afraid to venture upon any thing. A few fine samples offered in vain yesterday were withdrawn this morning, and for good high mixed new wheats about 37/ were bid, at which, however, the importers would not sell. The tenor of the next English advices will finally decide the course of our prices; but we do not believe that real good fine wheats will materially give way until all hope of a final advance has vanished. The finest wheat in the hands of the Polish importers are not at this moment to be had under 45/ per quarter, and of these our stocks do not exceed 350 to 400 lasts."

"HAMBURG, *2d August.*—The accounts from all parts of the north of Germany agree in stating the appearance of the wheat as very luxuriant; the cutting has been begun in some districts, and will be general in a week or fortnight. The crops of barley and oats will probably be deficient, but still more so those of hay, beans, and pease; in all these articles there is nothing doing except for the consumption of the town. Wheat of fine Marks quality, weighing from 61 lb. to 62 lb. per bushel, was yesterday sold at 34/ free on board. For Anhalt wheat, of 60 lb. and 61 lb. per bushel, 31/ to 32/6 are demanded. The price of oats in the Danish Islands is 8/9, and for barley 11/6 per quarter, free on board. Rape-seed, though a short crop, is of fine quality, and fetches from L. 23, 12s. to L. 24, 5s. per last, free on board. Linseed cake L. 6 : 17 : 6; and for rape cake L. 3, 14s. to L. 3, 16s. per ton, free on

board. For white clover-seed there is some demand, at from 40/ to 45/ per cwt. free on board; but for red there is hardly any inquiry, it is held at from 31/6 to 50/ per cwt.

In our last report we merely adverted to the attempt which was about to be made by the millers of this country, to be permitted to grind foreign corn, and export the flour, or manufacture it into biscuit, to our colonies, or to foreign parts. Since then, the object of the millers has been embodied into the following resolutions, under the guidance of Mr John Collier, Member for Plymouth. We give them as we find them in Mr Isaac Dimsdale's Universal Corn Reporter, for 10th June.

"1st, That when the restriction on the import of foreign flour and biscuit into our colonies was removed (about 1825), no provision was made for enabling the English miller and biscuit-baker to compete with foreigners for the supply of our colonies, which has had the effect of throwing this branch of commerce entirely into their hands, and of causing loss of employment to British subjects to a considerable extent.

"2d, That this trade may be restored, with advantage to many English interests, and without injury to any, by foreign corn being permitted to be manufactured into flour and biscuit, with provision that the quantity of wheat so delivered out of bond shall be (or this might be done before the corn is taken out) replaced by an equal quantity of flour and biscuit (deducting the usual allowance for waste in manufacturing the same), on the same principle it was effected by an act passed in the year 1824, entitled "An act to permit flour to be substituted for foreign wheat secured in warehouses," subject to such variations in detail as circumstances may require.

"3d, That such a measure would immediately restore a branch of trade to the English miller and biscuit-baker, by which a considerable capital and a great number of men would find employment. It would also prove highly beneficial to the English merchant, by liberating a quantity of foreign corn now taking injury in the granaries, and at the same time benefit the agriculturist by setting free a large sum of money now absorbed in this corn, a great portion of which would be laid out in English grain, and thus remove one great cause of the present depression in the English markets. The shipowner would also derive benefit, by being able to obtain biscuit and flour at a considerably lower rate than can now be done by foreigners.

"4th, That such is practicable has been proved by the operation of the act of 1824, and if any doubt rested on this head, the experiment may first be tried on the foreign corn now in bond."

These resolutions were strengthened by the consideration, that foreign corn can be at present imported to the islands of Guernsey and Jersey, *duty free*, and the exportation of their produce to Britain is also free of duty, by which means the inhabitants of those islands can supply flour and biscuit from foreign corn at a cheaper rate than the British miller and biscuit-baker can, unless the latter were also allowed to manufacture flour and biscuit from foreign corn. These proposals were placed under the consideration of Government, who could not undertake to bring forward any measure on the subject for the present.

We see no valid objection to employing our millers and biscuit-bakers in making flour and biscuits from foreign wheat, and supplying our shipping and colonies with those articles, provided only the labour of the foreign miller and biscuit-baker were supplanted, and not the flour and biscuit manufactured from wheat of British growth. Without such a guarantee the present Corn Law would soon be entirely evaded. We question very much the opinion expressed in the third resolution, that the large sum of money which would be set free, and which is at present absorbed in foreign bonded corn, would be afterwards laid out in the purchase of English grain. Were the making of flour and the baking of biscuits from foreign corn a profitable speculation, the money let loose by that speculation would assuredly be again employed in the purchase of foreign corn. If not, the British speculator in foreign corn would not study his own interest!

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ON THE MANAGEMENT OF CATTLE DURING THE PREVALENCE OF EPIZOOTIC DISEASES. *By CHARLES WILSON, M. D. &c. Physician to the Kelso Dispensary.*

AT the present period, when the agriculturist may congratulate himself upon the fortunate circumstance, that his herds, during late years, have not, generally speaking, experienced any serious losses from the occurrence of epizootic disorders, the following observations may appear to be rather untimely, and may not, perhaps, be received with that degree of attention which they might have elicited, had they been published at a time when the interests of the breeder and rearer of cattle were more closely and extensively threatened. Yet it surely can be no unwise policy to anticipate the recurrence of an event which past experience has taught us is but too apt to present itself; and it has, therefore, appeared to me that I might be rendering a not unacceptable service, were I to throw together a few plain observations on the means which ought to be adopted during the prevalence of an epizootic affection, with the view of mitigating or checking its ravages. In undertaking this task, though I may seem to trespass on the province of the farrier, I do not altogether forsake that of the physician; for there is no such disparity between the kinds of management required for an

epidemy occurring in the human species, and an epizooty amongst the lower animals, that he who has necessarily acquired some degree of knowledge of the one, should not be able to form just ideas of the other also; and, accordingly, it was natural enough that one who was engaged with the study of the former, should be induced to carry his attention farther to the latter, class of diseases. It is to the farmer that the succeeding remarks are particularly addressed. He may often be called upon to act on his own resources, in cases of disease evincing itself amongst his stock, for there are few districts (notwithstanding the laudable efforts of the Highland Society and the School of London, whose partial success it is pleasing to acknowledge) which have the advantage of possessing a person so thoroughly skilled in the veterinary art, as to merit a full confidence.

As soon as any disease begins to manifest itself to a considerable extent among the cattle upon a farm, it becomes the duty of the proprietor to investigate its causes with the utmost care, and to endeavour to ascertain whether it has its origin from any circumstance merely local, or whether it depends upon certain causes, extraneous to such as may be derived from evident peculiarities of soil or of situation. It will be necessary, in short, to discover whether the affection in question be one of an epizootic or of an enzootic * nature, as with this distinction the means to be subsequently adopted are most materially connected. If the farmer observe that the disorder is either confined to a portion of his own stock exposed to the action of causes which have notoriously the power of inducing disease, or if he find that the malady has also occurred in other parts of the district, but only where the stock was placed under similar circumstances, while all the cattle which were not subjected to these pernicious influences have escaped the infection, he will be justified in considering the malady of an enzootic nature, and his future plan of procedure will be at once clearly and definitely laid out. Thus, in cases of rot in sheep, whether he attribute the appearance of this disorder to the effects of eating a rank after-grass, or to the more probable cause of an exposure to cold and moisture,

* The terms Epizooty and Enzooty, are throughout preferred to the more generally used ones of Epidemy and Endemy. A glance at their etymology will shew that the latter can only be applied correctly to the diseases of man.

by allowing the flock to remain for too long a time upon a marshy pasturage, he will be compelled to admit that the disease is an enzooty, and the remedy of a change of situation will readily suggest itself. Instances of a similar nature with reference to cattle come frequently under the observation of practical men, and in most of them the cause is easily discovered. Amongst the less common ones, the disease termed Mindering may be mentioned. This affection is well known in the vicinity of Mendip, and is characterized by the appearance, along with other symptoms, of great difficulty of breathing, commonly accompanied by convulsions. The disease has been traced to a cause purely local; viz. the deposite of oxide of lead, proceeding from the mines and smelting houses in the neighbourhood, which either reaches the pasturages in a state of vapour, or is brought down by the brooks, and left upon the turf at their margin. A species of tubercular consumption is also a well known inmate of the great byres in Paris, and affords another example of what must be termed an enzootic disease.

If it be found, however, that the disease cannot be traced to any such causes, but that it seems to extend itself indiscriminately over every variety of soil and exposure, it will be necessary to consider it as an epizooty. Here another question of much interest, but often of very difficult solution, presents itself. Is the disease a simple epizooty, or an epizooty with contagion? This, in many instances, it will be found impossible to answer. It will therefore be ever the wisest method to act upon the supposition that in all cases contagion is present, for in this way only shall we be able, in the present state of our knowledge, to avoid risk. And we shall find a farther reason for this practice in the fact, that a simple epizootic affection, depending primarily upon causes connected with the state of the atmosphere, may become during its progress of an evidently contagious nature. If we admit the existence of contagion at all, we are enforced also to admit the possibility of its occasional spontaneous development, otherwise we should be reduced to the absurd conclusion, that the germs of every contagious affection peculiar to any race of animals, existed at the creation in the first individual of that race; a circumstance which might, in such an instance, have given rise to a somewhat remarkable tissue of disease.

Some of the contagious diseases of the lower animals are capable of developing a germ sufficiently powerful to propagate itself, independently of all aid from foreign circumstances, through an unlimited series of individuals. This seems to be the case, for instance, with the foot-rot in sheep, and with the vaccine virus in cattle. But these are by no means, generally speaking, a very important class of diseases, and with them we have at present no concern. Those affections whose fatality has rendered them most dreaded, will, on the other hand, be found to possess indeed the power of generating a contagious germ, but it is one which cannot either mature or extend itself without the aid of certain favouring states of the atmosphere; while sometimes also it seems to gain the assistance required for its full development, from errors in the diet, or from want of care in the management, of the different kinds of stock. Thus, the too great heats of summer have been thought to favour the ravages of a sort of typhus, which ordinarily first shews itself during their continuance; the humidity of the atmosphere, common in certain months of the year, sometimes gives rise to inflammatory and catarrhal affections of a very fatal description, in which the co-existence of contagion has been more than once suspected; and the quarter-ill, another contagious disorder, chiefly attacks those animals which have been too highly nourished. The want of good water also, of proper exercise, and of cleanliness, will doubtless greatly favour the extension of disease. These brief views seem to me to admit of a highly important application, and perhaps the little which has here been stated with regard to them, will be sufficient to serve as a basis for the principles which are to follow. Were I to prosecute this part of the subject farther, it might lead to speculations on the existence and nature of contagion, such as would be attended with considerable difficulty, and which, when attempted by others, have hitherto, for the most part, furnished us with results far more curious than useful.

On the first appearance, then, of an epizooty in a country, the farmer whose herds have not yet been infected, and who is anxious to preserve them in a sound state, will, for this purpose, keep in view the preceding remarks:—he will reflect that if all extremes of heat and cold, if too much moisture, a confined unwholesome air, and inattention to diet and cleanliness, be con-

ducive to the progress of contagion, such a situation must be chosen for his cattle as will best protect them from the operation of these causes. He will select, therefore, a dry and well sheltered enclosure, such as will afford a supply of pasture rather scanty than profuse. In this he will cause a shed to be erected, into which the animals may retire either from the noon-tide heat of the sun, or from the effects of an inclement season. No matter how rude this covering may be, it will answer every purpose if it afford to the cattle the protection required. It will be a great desideratum also should the field be furnished with a good well, the water from which should be pumped into a large trough, so that the cattle may have a full supply of it in its greatest purity. A pond by no means presents the same advantages, as the cattle are apt to stand in the water, which becomes a deposite for every kind of pollution, and may thus tend to frustrate our plan of prevention by its tainted and unwholesome qualities. Over this field a surveillance must be kept with every possible degree of strictness, in order that all communication, of whatever kind, may be prevented with the infected quarters. The farmer who is able to place his cattle in such a situation as that which has been described (and this in general may easily be accomplished), will have them in the very best state possible for resisting the attacks of any prevailing disorder. When we add to this, that in case of the disease shewing itself, all that is required is to separate the infected individuals from the rest of the herd (maintaining both in situations as nearly resembling that described as can be procured, and subjecting the unsound portion, of course, to the proper veterinary treatment), we have, I believe, noted every thing which is necessary for the proper management of cattle stationed in the fields.

Cattle placed in byres or other confined buildings must be considered to be under circumstances of all others the most favourable for the propagation of disease. In order, therefore, to resist this increased susceptibility for the action of contagion, our precautions must be redoubled. It is scarcely to be feared that the farmers will shrink from the task thus imposed upon them, and determine upon trusting the safety of their cattle to chance, rather than follow that path which their own interest points out, and the apparent difficulties of which a very slight

attention to method would speedily remove. But the destructive ravages of epizootic disorders have more than once caused the losses of the individual to become a matter of public anxiety, lest the markets should be deprived of their usual supplies, and a famine should extend suffering and alarm among all classes. In one instance, 30,000 head of cattle perished in Italy, within the Ecclesiastical States alone, in the space of a few months. In 1714, Holland lost more than 200,000 horned cattle, and in the small territory of Piedmont, 70,000 perished during the same year. Other countries, Britain not excepted, have also suffered to so great an extent, that special enactments have been made for the purpose of guarding against the repetition of similar disasters. Measures, which have been accounted of so much importance as to require more than once a compulsory interference on the part of Government, are surely not likely to be neglected by the now highly intelligent farmers of this country, who have only to examine their own records to discover that the pestilence has already but too often stalked across our isle, and scattered the seeds of death among our herds with a prodigal hand.

The walls of the buildings in which cattle are kept, should be at least from 8 to 10 feet in height, and the interior should be moderately lighted and kept free over-head to the summit of the roof. As few animals as possible should be kept together in the same building, so that the disadvantage to their health of crowding them together may be avoided, and in case of an infectious disease making its appearance, there will be less risk of its spreading. The common custom of making the couplings of the roof a place of deposite for various bulky articles, is much to be deprecated, as tending to impede the processes of cleaning and ventilation; while the articles themselves, in cases where disease is present, are likely to be imbued with the infectious virus, and may thus become what are termed *fomites* of infection,—or receptacles, by means of which the germs of the epizooty are stored up and retained in the midst of its victims. The roof should contain one or more ventilators according to the size of the byre; and open bolls at the head of the stalls, such as are used for the purpose of throwing in food, should in no wise be permitted. The reasonableness of the latter prohibition will be evident to all those who consider, that cattle placed in byres

and debarred from all exercise, cannot be in a proper condition for resisting the effects of the chilly draughts of air, which, during the winter months, must be continually rushing through these apertures (seldom or never carefully closed) into the warmer atmosphere of the building, and passing at their first entrance directly over the cattle. The true object of ventilation is to procure the gradual, yet constant, renewal and diffusion of pure air in a given space, without producing draughts, and this is best to be effected by placing ventilators in the roof, and, in peculiarly confined situations, by having a corresponding opening in the door or side-wall. Cleanliness must of course be attended to;—the litter must be frequently changed, and the byre regularly swept out. Should there be reason to apprehend the *near approach* of an epizooty, a few further precautions will be found expedient. The nature of the food, which previously was left to be regulated according to the plans and resources of the proprietor, should now be restricted, in so far as to avoid all attempts at rapid and excessive fattening. The extensive use of oil-cake and of the refuse of distilleries should be laid aside, and what food is used may be advantageously mixed with a moderate portion of common salt. The salutary effects of salt, when given along with the food of herbivorous animals, have long been well ascertained, and if we are to confide in the tradition, that, when the plague raged with great violence in Shields, the persons employed about the saltworks entirely escaped the infection, we may be inclined to concede to this mineral the merit of possessing something like a specific power against pestilential diseases. I need not add, however, that it is far from being proved to possess any such virtue. But there is another tradition, on which, besides, the light of modern science has been reflected, in whose value we are entitled to place greater reliance. It had long been remarked that, during the prevalence of the plague in Marseilles and other cities of the Mediterranean, those individuals connected with the making or carrying of oil almost universally escaped the disease. Such a fact naturally attracted the observation of scientific men, and experiments were instituted to ascertain whether oily frictions could really be said to be of avail against the attacks of contagion. The result of this was, that many persons, such as Luigi di Pavia, Mr Baldwin,

Professor Frank, Dr Assalini, &c. gave it as their testimony, that in this process lay the most certain of all safeguards against the accession of pestilential diseases; and farther, that in cases where the frictions had not been employed till after the disease had appeared, they proved highly beneficial as a means of cure. It would be foreign to the purpose of this essay to enter minutely into the various facts and reasonings upon which their conclusion was founded. Suffice it to state, that they appear to be of great authenticity and importance, and that there can be little doubt that the practice advised may be extended with advantage to the lower animals, as a means of prevention against the diffusion of pestilential disorders among them. The plan which is recommended below for this purpose, has not, I regret to say, been as yet exposed to the test of experience, though I have sought occasions for giving it a fair trial; but it rests on a sound analogy, and may perhaps, one day, attract the attention of some individual whose opportunities and judgment may fit him for ascertaining its worth.

The frictions are to be performed with any of the cheap vegetable oils (linseed oil, for instance, which may be obtained at one shilling per quart, or cheaper if bought in large quantities), and may be used every second day. The oil should be heated, by placing the vessel containing it for some time in another vessel of boiling water, and may be applied by means of a sponge, rubbing it well over the animal when as hot as the hand can easily bear it. A little more than half a quart of oil will probably be found sufficient for each animal. The skin is then to be smartly rubbed, until dry, with coarse woollen cloths, and afterwards some warm boiled food may be given. In cases where there is much reason for alarm, the process may be repeated daily. This simple measure probably derives its efficiency from the warm oily frictions proving a means of softening the skin, and opening the mouths of the exhalant vessels, so that the cutaneous transpiration, so necessary to the healthy state of the system, is duly kept up, and the balance of the circulation more steadily maintained, thus avoiding those congestions of blood in the deep-seated parts, which are usually among the first concomitants of contagious diseases, especially those of the typhus kind. Nor is it absurd to imagine that the same process

which relaxes and opens the pores of the exhalants, may obstruct and close the mouths of the absorbent vessels, which also terminate on the skin, as these vessels act under obviously different circumstances, and on different media. The absorption of contagious miasmata from the air, through one great channel of ingress, may thus be prevented.

Should the disease continue close at hand, and the alarm be urgent, though the infection have not yet broken out in the byre itself, it will be proper to have recourse to those disinfectant means which are borrowed from chemistry. The process which I have here to recommend can boast of no novelty, but it differs from that generally in use; and I am therefore desirous of stating those reasons which appear to me to entitle it to a preference. Perhaps the following remarks, though they have no pretensions to scientific precision, may be sufficient for my purpose.

Various processes have been at different times recommended as disinfecting means. Large fires have been kindled in the open air, and gunpowder has been exploded in considerable quantities. Beyond the power which these means have of producing a temporary agitation of the atmosphere, we ought to look for no other effect from them than that of spreading large volumes of noxious gases through the air. Fumigations, practised by inflaming different resinous and aromatic substances, such as tar, camphor, the essential oils, &c. have also been employed; but by this way, too, we ought rather to expect a vitiation than a purification of the atmosphere. Accordingly, all these methods have been found valueless, and abandoned. Another process, namely that of *acid fumigation*, has enjoyed a higher reputation, which it still in a great measure retains. The alleged power of the mineral acids to destroy contagion appears to have been known by Sir John Pringle, a physician whose character and eminence reflect the highest credit upon this district, of which he was a native. Afterwards, in the year 1758, Dr Johnston of Kiddermister announced that he had employed the vapour of muriatic acid with success, in correcting the contagion of a very malignant fever. But it was by Dr Carmichael Smyth that the discovery was first brought into general notice, and by him fumigations with the nitric acid gas were extensively employed in the apartments of the sick. Both of these me-

thods, however, declined considerably in reputation upon the discovery made by Guyton de Morveau, who, proceeding upon the assumption that the oxymuriatic acid gas, or chlorine, decomposed, by burning or corroding, all animal miasmata, recommended that gas as the most certain of disinfectants. The process of De Morveau was received with much favour throughout all Europe, and especially in Spain, where it was for some time considered as an anchor of safety against the fatal yellow fever. But it was in that country, too, where its utility was first called in question. In 1804, M. Nysten published a series of observations, made in Malaga, Carthagena, and other places, which do not permit us to doubt that the chlorine fumigations have proved wholly useless in the numerous epidemics with which the Peninsula has been afflicted. The observations of Dr Arejula lead also to the same result. The latter physician was employed, in the year 1805, by the King of Spain, to preside over the disinfection of all the cities and towns of Andalusia; and he gives the following as the conclusions at which he arrived:— "Never was any disinfection made with more care and exactness than that of Malaga in 1803, nor, at the same time, was there ever an epidemic more general and more fatal than that of 1804; so that," continues the author, "I can assert, after having learned it by experience, that when all disinfection has been omitted, the pestilence has not reappeared, as has been observed at Malaga itself, and in many other places, in 1800; at Cadiz and Seville in 1801; and in numerous districts in 1804. On the other hand, when, at another period, Cadiz and Seville had been disinfected with extreme care, the malady returned the following year, as in 1804 at Malaga." Upon the whole, Dr Arejula considers the chlorine fumigations as wholly inefficient, and appears even to have some doubts whether they may not prove hurtful.

These are strong facts, and there is no want of others to confirm them. Nor is the experience of chemistry at war with the results of medical observation. No one doubts the power of chlorine to destroy putrid odours; and if we could believe that the contagious virus was nothing more than a *bad smell*, the efficacy of De Morveau's fumigation might at once be admitted. But such an idea is too ridiculous to be entitled even to refutation. Yet beyond this power and that of destroying colours,

we do not find that chlorine has any strong decomposing effect upon animal substances. We can readily trace its action upon any putrid odour, because we are acquainted with its affinities for the sulphuretted hydrogen, the hydro-sulphuret of ammonia, and the ammonia itself, which are the fetid products of the putrid fermentation. Strictly speaking, too, these are not animal substances, but are certain compounds of elementary bodies, which are common to the various kingdoms of natural history, and the very existence of which, in a free state, becomes an evidence of the prior disorganization of the animal matter. Perhaps, therefore, we are justified in saying, that in no instance, save that alluded to respecting colours, does chlorine exercise any powerful decomposing effect upon animal substances. Its action does not begin till that decomposition has already taken place through the agency of other causes. As an instance of the inefficiency of this gas as a decomposing agent, it may be mentioned, that I caused two pieces of meat to be put into different vessels, into one of which was poured a quantity of water, and into the other an equal quantity of a solution of chloride of lime, of the strength usually recommended for disinfection, and set both aside for observation. At the end of five days the portion of meat lying in the water had become lax and flaccid in its tissues, and shewed evident signs of decomposition, by its tainted smell, and by the bubbles of fetid gas which gathered constantly on the surface of the water. On the other hand, that which was immersed in the solution remained firm and compact, and shewed no traces of decomposition whatever. Here, then, was an instance, not of the decomposition, but of the preservation, of a combination of primary animal substances, through the agency of chlorine; and had these substances been tested separately, we should have found that the gelatine would have been little altered, that the albumen would have only undergone coagulation, while the action upon the fibrine could have borne no comparison with that which might have been effected by the nitric acid, and other well known substances. Now, we are utterly ignorant of the precise qualities of the contagious virus, but we must at all events acknowledge its animal nature and origin. With what justice, then, can we recommend for its destruction a substance which has been found so inert in its

action on other animal matters? In the present state of our knowledge, it is, in fact, impossible for us to assert that it does not form new combinations with the contagious matter, possessed of even more virulently deleterious powers. Thus, both theory and practice yield results opposed to the use of chlorine as a disinfectant; and, I may add, that I am not, for somewhat similar reasons, inclined to place much greater reliance upon the use of muriatic acid.

The method recommended by Dr Carmichael Smyth, however, appears to be founded on more rational principles. The remarkable power displayed by the *nitric acid* in depriving animal substances of their azote or nitrogen, the presence of which is the leading point of distinction, in a chemical view, between vegetable and animal matter, places it at once in a conspicuous aspect as a decomposing agent. The change effected by the nitric acid is not one of properties merely physical, affecting only the density or bulk of the body submitted to its action: it is a complete and general decomposition, by which the structure and character of the animal substance undergoes a total change, and becomes converted into a matter resembling, in its chemical properties, the structure of objects of a vegetable nature. Now, it appears evident, that any body which has undergone such a transmutation as is produced by the play of affinities referred to, can scarcely be expected to retain any of its former properties, of whatever description. We may, therefore, reasonably hope, that the peculiar animal matter which constitutes the contagious virus, may be so changed by the process of nitric acid fumigation, as to be deprived of its noxious qualities. M. J. Balcells, who was employed by the municipality of Barcelona, in 1821, to submit to them a process of disinfection after they had thrown aside all confidence in the chlorine fumes, has made a highly ingenious application of the peculiar power of the nitric acid in the plan which he then suggested; but as his process is of a complicated nature, and too difficult for general use, we must pass it over with only this brief notice. We must treat also in the same manner the method of Mitchill, which has obtained great vogue in the American United States, but which rests on no better foundation than the vague theory, that all the volatile animal poisons are of an acid nature, and are therefore to be de-

stroyed by the use of the alkalies or alkaline earths. To this plan, however, may be referred the process of washing woodwork and the walls of houses with quicklime and water, which has been frequently adopted in this country, and which may prove useful, both from the caustic nature of the application, and from its being friendly to cleanliness. Before leaving this branch of the subject, it is proper to notice another method of acid fumigation, which may be usefully applied where it is wished to destroy contagion, and at the same time to remove putrid smells, should they exist. This is to be effected by mixing two parts of saltpetre with one of common salt, and moistening them thoroughly with sulphuric acid. The vapour given off in this process is not a mere mixture of the muriatic and nitric acid gases, but a mutual decomposition takes place, part of the nitric acid losing a portion of its oxygen, and the muriatic acid parting with some of its hydrogen. Hence the products consist chiefly of nitric acid and chlorine, with nitric oxide (shewn by its red fumes) and muriatic acid. Those who have followed what has been said of the properties of chlorine and the nitric acid, will readily perceive the advantages which may occasionally be derived from this combination. The *nitric acid fumigation* may be accomplished by putting an ounce of sulphuric acid into a cup or saucer, which is to be heated gradually over a lamp, adding from time to time small portions of saltpetre. Either of these fumigations should be repeated on alternate days while the alarm continues. Should the disease actually appear, they must be had recourse to at least once daily; keeping always in mind, that on the simple chlorine fumigation, no just dependence can be placed, and that it is the nitric acid which we are chiefly to trust as a disinfecting means.

During this time all communication with infected quarters must, of course, be carefully cut off. This can scarcely be effected by any *general* system of cordons, exclusive or inclusive, placed under the regulation of the police. Such a system has been found to fail completely in foreign countries, where the genius of the people might have submitted itself to the requisite degree of coercion more willingly than could be expected from the native of England, with his sturdy notions of freedom in word and deed. In the act 30th George II. cap. 20, which is followed up

in part by the 9th George III. cap. 39, are to be found clauses empowering the establishment of such cordons, with a number of other regulations of the most vexatious description, and, at the same time, of such difficult enforcement, that they must have been easily evaded on all hands. If the farmer or dealer in cattle does not choose to take heed of his own accord, that no infected animal shall have communication with his flocks and herds, it is not likely that he will be induced to do so by the fear of any enactments, which can only be enforced, and that even very imperfectly, by a constant system of inquisitorial watchfulness, foreign to the habits of the people, and maintained at an immense expense. It is not to be expected, therefore, that the cordon will ever be found practicable or useful in this country; and it would be as well, that the only restrictions, in cases of epizooty, should apply to the preservation of the safety of the lieges by the prevention of the sale of tainted meat and skins.

The preceding directions have been mostly suggested under the supposition that no case of disease has as yet appeared on a given locality, though there are pressing reasons for fearing its speedy encroachment. Let us now suppose, that, in spite of all precautions, a case has actually occurred, which will at once be detected by the appearance of the usual initiatory symptoms, a previous knowledge of which should be obtained, and their advent carefully watched. A fitting place must now be set apart as an hospital, and the infected animal immediately removed into it, and subjected to the proper treatment, which will of course vary according to the nature of the prevailing malady. The litter on the place which the animal formerly occupied must be carefully removed, and either burned or carried to a distance, and not into the court, where it might become a farther source of contagion. Any remains of food should also be removed, and the stall well washed with water, to which a little quicklime has been added. The wood work must be thoroughly washed, and not so much as a spider's web allowed to remain. The fumigation recommended above should then be employed, and may be repeated in the course of a few hours. As, in most instances, the duty of attending upon the sick cattle will fall upon the same individual under whose charge they were when in a healthy state, a few precautions will be advis-

able, in order to diminish the risk of his becoming a means of extending the infection. In ministering to the distempered animals, he should wear above his ordinary dress a coarse linen frock, sufficiently long to cover the limbs to the wrists and ankles. This should be worn constantly while in the hospital, and laid aside immediately after leaving it, when the hands should be well washed, after which the man may undoubtedly approach the sound portion of his charge with infinitely less risk of communicating the disease. No utensils should be used in common for the sick and the healthy; and no individuals, saving those having charge of the sick, should have access to the place set apart as an hospital. Even cats and other animals should be carefully excluded, as instances are not wanting where there was strong reason to suspect the dissemination of infection through such media. Besides, the intruders themselves may fall victims, for, although it is rare that an epizooty extends itself at the same period among different classes of animals, yet instances of this kind have been found to occur.

Should a death take place, the carcass should be buried entire, as nothing can justify the attempt to sell the meat as food for man *, and danger may be incurred by retaining the skin, as a probable powerful source of farther infection. Nor is the act of stripping the skin unattended with peril. It is only lately that a case came under my care, where a man had received a slight scratch while skinning a cow which had died of fever after parturition, (a disease which in the human species often wears something like an epidemic form), and the consequence was an immediate diffuse inflammation of the cellular tissue, accompanied by high fever, so as to put his life in imminent danger. The same, or equally perilous, results have been observed by others, after various epidemic disorders, especially those of a putrid nature, and sometimes, it is alleged, when the contact was merely mediate. In the typhoid epizooty of 1714, several peasants, who had killed an ox labouring under the disease, were attacked with inflammatory symptoms of which they died; and facts of the same description were observed frequently in the pestilences

* The experienced M. Huzard of Paris, has, in a paper published a few months ago, dwelt chiefly on the necessity of excluding from the markets, the flesh of cattle which have perished by the malignant pustule.

of the years 1774, 1783, and 1822, all of which were distinguished for their severity. On the other hand, it may be noticed, that the epidemic diseases of man may be communicated to brutes. In the plague at Marseilles and elsewhere, many domestic animals were observed to be affected, and died. Boccace, the accuracy of whose graphic description of the pestilence at Florence has never been disputed, tells us that many animals perished from coming in contact with infected articles, and among others, he mentions, that two swine which had been observed pawing and tearing at the clothes of a poor man lying in the street, were seized as if they had taken poison, and speedily expired.

Such appear to me the principal points of management to be attended to during the prevalence of epizootic diseases. Other modes of prevention, however, have been suggested, with the notice of two of which these observations shall be concluded. Thus, the slaughter of all the animals attacked by any contagious epizooty, or exposed to its influence, has been often strongly recommended, and even many times in this and other countries of Europe, especially France, been carried partially into effect. To expect any benefit from this practice, which one must at least admit to be not wanting in decision, it must be had recourse to on the first breaking out of the disorder, so that the progress of the infection may be checked, or rather its existence terminated, by depriving it of the victims necessary for its sustenance. But how completely would the very proposal of such a measure, sanctioned though it be by the modern authority of Vicq d' Azyr, and by the ancient and practical one of Virgil,—

> Continuò culpam ferro compesce, prius quàm
> Dira per incautum serpant contagia vulgus ——,

serve as an acknowledgment of the inefficiency of the veterinary art on this important head! It is almost impossible to believe, that a strict attention to the various recommendations given above, could entirely fail in checking the disease or mitigating its virulence; and however severely the disorder may set in, there is still this source of comfort to the proprietor of cattle, that an epizooty shows always its greatest violence at the commencement, that the proportion of deaths becomes smaller

as the malady extends, while towards the close of its career almost all those attacked recover. The practice of slaughtering, therefore, as placing a bar to the farther improvement of the veterinary art, as efficient only when employed at the commencement of the epizooty, and as serving to destroy many animals who might otherwise have a chance of recovery, does not appear to merit approval. Lastly, inoculation too, by means of the sanies which flows from the nostrils of animals sick of typhoid disorders, has also been recommended as likely to lead to a more benignant form of disease; but the practice rests upon no sure basis, nor has it been attended by such results as were fitted to induce its continuance. With the singular exception that calves, the produce of cows which had been cured of typhus, seemed to benefit by its use, the plan appeared to be ever productive of effects rather hurtful than salutary.

THE THEORY OF PUTRESCENT MANURES.

At page 76 of this volume, we gave some detailed statements of the difference which existed between theory and practice in the application of putrescent manures; and we defended the practice against the suggestions of theory in this department of scientific agriculture, for this simple reason, that the crops which the manure raised, when applied as practice, or in other words experience, dictated, were much better than they would be were it applied according to the suggestions of theory. Sir Humphry Davy was the first who embodied into a system the principles of chemical science as applied to the operations of agriculture, and which system was first promulgated in a course of lectures delivered before the late Board of Agriculture. In that system was detailed all that was at that time known of scientific agriculture. Among the many other statements in that system occurs the following, in regard to the application of rotten dung. "As soon," says this distinguished chemist, "as dung begins to decompose, it throws off its volatile parts, which are the most valuable and most efficient. Dung which has fermented, so as to become a mere soft cohesive mass, has gene-

rally lost from one-third to one-half of its most useful constituent elements, and that it may exert its full action upon the plant, and lose none of its nutritive powers, it should evidently be applied much sooner, and long before decomposition has arrived at its ultimate result." This opinion was promulgated in 1809, and it has till lately received the confidence of most chemists. But experience nevertheless continued to act in direct opposition to this opinion. Manure continued to be applied in "a soft cohesive mass," and it continued to raise large crops; whereas, had it been applied "long before decomposition had arrived at its ultimate result," the result would inevitably have been a loss of crop, manure, and labour.

It is certainly an erroneous assumption to say, the first stage of fermentation in dung must necessarily throw off its most valuable parts. Every dunghil of fresh dung throws off a gaseous exhalation a very short time after it is put together, and the quantity thus thrown off is regulated by the state of the atmosphere. But this exhalation does not consist of the valuable gases; it is a mere evaporation of the water contained in the dung. The same hot haze may be seen flickering over a fallow field in a sunny day in summer. Nobody could with truth assert, that this haze arises from the disengagement of the gases in the dung which had previously been inserted into the soil, when it is clearly nothing more than the evaporation of the moisture in the soil. In Saxony, hay is made by heaping together the cut grass, fermenting it for a short time, and afterwards drying it in the sun: but in this process, nobody would say that the nutritious portions of the grass are dissipated, when it is only the superabundant aqueous portions of the grass which are driven off by heat. To say, therefore, the first stage of decomposition in a dunghil throws off "the most valuable and the most efficient" parts of the dung, is just to say the vapour of water is the most valuable part of dung.

It is true, were the fermentation continued after all the water in the dung was evaporated, a considerable increase of temperature would ensue; and when the texture of the fibrous portions of the manure began to decompose, there would be an evolution of valuable gases. Direct experiment has proved the escape of gases from a heap of dung which has been long fermenting.

But what harm accrues to the dung as a manure from the escape of these gases? None whatever. We are told these gases constitute the food of plants, and if they are permitted to be dissipated by decomposition, the quantity of nourishment in the heap of manure will of course be so much diminished; that if the bulk of the dung heap be diminished one-half or one-third by excessive fermentation, the quantity of nourishment to the crops will be diminished in a greater ratio. These cautions have long been whispered in the ears of practical men, but they have listened to the advice with a provoking indifference. Like ducklings when they first take the water, they have continued to disregard every remonstrance of their foster brethren against injurious practices, raising and devouring their food, and enjoying themselves with the greatest complacency in their vocation. It is true, and we must admit it, that some of the gases constitute the food of plants, but it does not follow that plants would receive them as food directly as they are disengaged from a fermenting and heated mass; nay, it is probable they would rather reject the food that would injure them. But as plants are not endowed with locomotive powers, they cannot avoid the food which is directly presented to them; they will therefore be obliged to partake of it even in an injurious state, and in thus taking it they die. Accordingly, we invariably find that plants suffer from the contact of fermenting dung, and it is this well known fact, more than from any other circumstance, which deters farmers from applying dung in an unprepared state. It is sometimes applied to the soil, it is true, in an unprepared state, but long before the crop is brought into contact with it, and after it has undergone fermentation in the soil. Though this application of dung is recommended by men of science, it is performed from the very opposite principle which they recommend. They recommend it because the gases arising while the dung is fermenting are absorbed by the soil, and are thence given out for the use of plants; on the other hand, farmers perform it because the fermentation will have ceased before the crop is inserted into the ground. Which of these is the more rational reason? The practical one undoubtedly; for it is surely impossible that the slight covering of earth upon the dung can prevent the escape of the elastic gases, however it may retard fermentation.

We may conclude from analogy, that plants, like animals, have a mode of consuming their food peculiar to themselves. They may not necessarily consume the food in the state we choose to prepare it for them. All they require is, that the materials which supply their food shall be placed in the soil in the state least injurious to them, and within their reach, and they will feed themselves. Now, what is the least injurious state in which dung can be presented to any crop? Experience has always said in "a soft cohesive mass." Recent discoveries show that practice has always spoken in accordance with science. Consequently, this recent concurrence of science is a tardy justification of practice.

The history of the recent discoveries alluded to, which shew the scientific accuracy of practice in applying dung in a rotten state, is this. In 1802, the celebrated chemist and analyst Klaproth, received from Palermo a substance which exuded spontaneously from the bark of a species of elm. To this substance Dr Thomson gave the temporary name of *ulmin*. It dissolves speedily in a small quantity of water, in which respect it is like a gum; but when the solution is very much concentrated by evaporation, it is not the least mucilaginous or ropy, nor does it answer as a paste. In this respect *ulmin* differs very essentially from gum. When a few drops of nitric or oxymuriatic acid are added to the solution, it becomes gelatinous, which, when slowly evaporated to dryness, and treated with alcohol, and again evaporated, leaves a light brown, bitter and sharp resinous substance. Thus, it appears that ulmin, by the addition of a little oxygen, is converted into a resinous substance. In this new state it is *insoluble* in water. This property is very singular: That a substance soluble in water should assume the resinous form with such facility is very remarkable*. Berzelius has found this curious substance in all barks; Braconnot in saw-dust, starch, and sugar. But what is more to our present purpose, Sprengel and Polydore Boullay have found it to constitute a leading principle in all soils and manures. Sprengel appropriately calls it *humin*, from its existence in all soils, *ulmin* being given to it by Dr Thomson several years ago as a temporary name.

* Thomson's Chemistry, vol. iv. p. 696–7.

"Humin appears to be formed of carbon and hydrogen, and the humic acid of humin and oxygen. Pure humin is deep blackish-brown, without taste or smell, and water dissolves it with great difficulty, and in small quantities; consequently it cannot, when pure, be available as food for plants. Humic acid, however, which is not sour to the taste, readily combines with many substances found in soils and manures, and not only renders them, but itself also, easy to be dissolved in water, which in their separate state could not take place. In this way humic acid will combine with lime, potass, and ammonia, in the form of humates, and the smallest portion of these will render it soluble in water, and fit to be taken up by the spongelets of the root fibres. It appears to have been from ignorance of the important action of the humic acid, in thus helping to dissolve earthy matters, that the older writers were so puzzled to discover how lime and potass got into plants; and it seems also to be this chiefly which is so vaguely treated of in older books under the names of *extractive, vegetable extract, mucilaginous matter*, and the like. Saussure, for instance, filled a large vessel with turf, and moistened it thoroughly with pure water; when, by putting 10,000 parts of it by weight under a heavy press, and filtering and evaporating the fluid, he obtained 26 parts of what he termed *extract;* from 10,000 parts of well dunged and rich kitchen garden mould, he obtained 10 parts of *extract;* and from 10,000 parts of good corn-field mould, he obtained 4 parts of *extract.* Polydore Boullay found that the liquid manure drained from dunghils contains a large portion of humic acid, which accounts for its fertilizing properties, so well known in China and the Continent; and he found it also in peat-earth, and in varying proportions in all sorts of turf. It appears probable, from Gay-Lussac having found a similar acid, the *azumic*, on decomposing the prussic or hydrocyanic acid, that the humic acid may be found in animal blood; and if so, it will account for the utility of blood as a manure for vines, &c. Dobereiner found the gallic acid convertible into the humic *."

Such is the history of this remarkable substance, which performs so important a function in the action of putrescent manures, and

* Rennie's Alphabet of Scientific Gardening, p. 12–13.

which is found in abundance in the "soft cohesive mass" of rotten dung. Let us see how it operates in manures.

The chief food of plants consists of the carbonic acid gas and humic acid mixed with water. Every manure is therefore only valuable which contains these substances in the greatest degree, and in such a state as they are most easily available to plants. Now, practice recommends the rotting of every kind of dung, whether simple or compounded, and the reducing it into a uniform dark brown "soft cohesive mass," similar in consistence to fresh peat, so that it may be cut with the spade; because it maintains that dung in this state is much more valuable to crops than fresh dung or mere litter, whatever may have been the quantity of carbonic acid gas which had evolved during its fermentation. Recent discoveries have proved the wisdom of this recommendation of practice, because they have proved that rotted dung contains much more carbonic acid gas and humic acid, weight for weight, than fresh dung. There is, it is true, a loss of bulk in rotting fresh dung, and of an evolution of carbonic acid gas during its fermentation; but the question is not what the volume of carbonic acid gas alone is in dung, but what is the most available state in which the carbonic acid gas in the dung can be presented to plants; and this is the rotted state, because in that state alone it contains the humic acid in quantity. All the black carbonaceous matter in dunghils is the humin ready to be converted into humic acid, which is in fact the cooked state of the food of plants. Moreover, practice finds that fresh dung is injurious to vegetation, and recent discoveries now inform us that this arises from the acridity of the ammonia, which is always present in unfermented dung. Fermentation drives off the acrid ammonia. Fresh dung is found to injure plants by *burning* them, which is a very appropriate term to describe the action of ammonia. In like manner, stale liquid manure is not so good a top-dressing to grass as fresh, or when it is largely mixed with water; because science now informs us, that ammonia becomes concentrated in stale liquid manure, and is therefore in an injurious state for plants; and that it is necessary to mix liquid manures largely with water, in order to dilute the ammonia, and allow the proper action of the humic acid, which exists in ;e quantity in them. Again, it is not an uncommon practice

to cover a dunghil with earth in hot weather, and this is now explained, not as it hitherto has been, that the earth absorbs and prevents the escape of the carbonic acid gas, which it could no more do than a balloon made of gauze could prevent the escape of hydrogen gas; but that a violent fermentation in the dung is checked by the earth partly excluding the atmospheric air and rain water, the oxygen in either of which is indispensable to continue the process, it being this oxygen which forms the carbonic acid gas by uniting with the carbon of the dung. The necessity of checking a *violent* fermentation in a dunghil which contains a large portion of horse-dung, is to prevent it being what is technically called "*fyrefangit*," a state of dung which is useless.

In regard to composts, it is found that to mix lime with fresh or rotten dung is to waste it, because, as is now explained, the lime takes up and renders useless the carbonic acid gas which they contain. In like manner, a compost of fresh dung and weeds, green leaves, grass, turf, and green vegetables, without lime, is valuable, because all these substances supply abundance of *humin*. On the other hand, lime promotes the fermentation of peat-earth, dry leaves, and every thing which contains hard woody fibre, and supplies *humin* in quantity.

It is requisite to attend to the seasons of manuring. Dung, in any state, is never applied to the land in winter; it is best applied in spring: it is injudicious to expose it to a hot sun in heaps; and it is improper to allow it to remain a length of time in heaps on the field. These practices are now easily explained, and are quite in accordance with science. In winter there are no crops in the field to which the dung can be applied: in spring, on the other hand, plants and seeds are ready to shoot forth into life; their roots are then most active to devour the nourishment which may be placed within their reach. To spread out rotted dung in hot weather and let it lie, must be to subject its component parts to the highest degree of evaporation; and to allow it to remain in large heaps for a time on the ground, is to give the portions of the ground which are covered by the heaps an undue advantage.

We thus see that science now agrees with that practice which has been pursued for years with unexampled success. It is con-

solatory to practitioners to think that their experience, though unknowingly to them, has guided them to success on really scientific principles. This agreement of experience and science should teach every one that science *and* experience, and not science alone, ought to be made the tests to try the accuracy of opinions. Unfortunately for the credit of science, the test of accuracy hitherto, in the application of putrescent manures, has not been submitted to practice. It is always for the interest of practice, however, to listen attentively to the suggestions of science. One of these suggestions as a rule to try the value of all sorts of manures, is, that they shall be judged by the proportion of carbonic acid gas and humic acid they contain or may evolve after they have been applied, and also by the quantity of water which they are able to take up and retain. The rule, when confined to carbonic acid gas and water, was supposed to lead to a correct view of the subject, independently of ascertaining the proportion of humic acid. But when the rule was confined to these substances before the discovery of the importance of the humic acid, we see the errors which even men of science fell into. Knowing now the effects of the important principle of humic acid, it ought to be strictly retained as a term in the rule; because, were the ability to retain water alone taken as a test, bog-earth, the most sterile substance in an undecomposed state, might be decided to be the best of all manures; and were the evolution of carbonic acid gas alone taken as a test, chalk should be an excellent manure,—and so it would always be could it be brought to take up and retain enough of water to dissolve a portion of it, which it can do by means of the humic acid. Now, let us apply these tests to rotten dung. There can be no question that rotten dung is very much superior in imbibing and retaining water, to what is fresh, unfermented, or beginning to ferment. A simple experiment can easily prove this to those who doubt the fact. "With respect to carbonic acid gas, humic acid and the minor materials of the food of plants," says a recent author, "there can be as little doubt of the superiority of rotten dung, which is, in fact, in a state very nearly approaching to the best leaf mould or virgin loam, and though a weighed quantity of fresh dung certainly will yield more carbonic acid gas than when this same quantity is allowed to ferment and rot, in conse-

quence of much of it being given off during these processes, yet the weighed quantity of fresh dung will bear no comparison in this respect with rotted dung. The quantity of humic acid is very considerably greater in rotted dung *." Hence, in treating in future of all putrescent manures, the very important effects of the humic acid must never be overlooked.

COMPARATIVE VIEW OF THE AGRICULTURE OF THE COUNTIES OF WEXFORD AND GALWAY IN IRELAND.

We shall now have a peep at Galway, the essential differences of which are, in our judgment, compared with Wexford, to be found in the quality of the soil, the description of fences, modes of tillage, extent of turf bog and of lakes, and, though last, not of least importance, in the appearance, habits, and manners of the population.

The county of Galway is double the size of Wexford, and is divided into sixteen baronies, three of which, viz. Moycullen, Ballynahinch, and Ross, occupy 350,000 acres. The greatest portion of the substratum of this extensive county consists of limestone: the divisions between this and the granite are generally well defined; even the superior verdure discovers immediately the limestone. Almost the entire of the county, beginning at either Bannagher or Ballinasloe, and continued to Galway, is calcareous. From Galway to Oughterard, in a western direction, the high road nearly marks the divisions between the two regions: all the country to the north of that road, and extending over Lough Corrib into the counties of Mayo and Roscommon, except the neighbourhood of Dunmore, is limestone; that to the southward of this road, comprehending the baronies of Ballynahinch, Ross, and Moycullen, extending upwards of forty miles long and sixteen broad, with the exception of some detached masses of primitive limestone, which occur frequently near the road from Oughterard to Clifden, is all either granite or other minerals of great variety of appearance. A remarkable tongue of fine limestone runs boldly into the moun-

* Rennie's Alphabet of Scientific Gardening, p. 55.

tains at Ballynagrieve, the estate of Lord Clancarty, but no use is made of it by his tenants, as far as I am informed. There is also a considerable bed of limestone with large shells in the river near Mr Martin's at Oughterard, part of which forms a charming natural cascade. Limestone of various kinds has been discovered by the late indefatigable Mr Donald Stewart, in the Sliebhbaughta mountains.

The soil of this county generally produces every crop in abundance. The wheat (particularly that which is produced to the southward of Galway) is amongst the best in Ireland, producing that fine bread which is to be found in Galway, Tuam, and other towns, and in almost every gentleman's house. The barley and oats, from the introduction of better kinds than were formerly sown, from the benefit of an extensive export, and from the establishment of extensive breweries at Newcastle and Galway, have been greatly improved in their quality, and the quantity astonishingly multiplied. This shews plainly, if it could be doubted, the incalculable benefit of a free export of corn.

Of minerals, there are fifty-one specimens in the Dublin Museum, among them several of iron, lead, and copper. It is to be hoped that the time will come when the riches which this county contains beneath its surface, will be rendered available to the employment of its people, and productive of more speculative enterprise in its proprietory, than is evidenced at present.

On a calcareous soil, as may be supposed, the wheat crops are excellent. The general appearance of Galway, excepting the rocky district of Cunnemara, compared with the undulations of Wexford, is flat. Mr Dutton observes that, about thirty years ago, one-third of this county was supposed to consist of mountain, bog, and lake, but that some high-lands and turf-bogs have been improved. He is of opinion, (and his Statistical Survey of Galway bears all the evidence of his intelligence, skill, and honest *straightforwardness* of observation), that many of the lakes could be drained or lowered, and especially instances Turlough More, near Tuam, and that chain of water from Castle-Hacket to Shruel, which are only occasionally flooded in winter. He remarks that the proprietors of these turloughs have been *wishing* these fifty years that this had been done, but

are unanimous in nothing but a desire to throw the *expense on any but themselves.* These turloughs maintain a few sheep to the acre during the dry months of summer.

There is some exceedingly fine land in this county, beginning at Gort, and taking the direction of Roxborough and Castleday, Coorine, Lord Clancarty's estate Park, and Grola. The estates of Mr Daly, and of Sir John Burke, are in this vein of land. Among the richest portions are to be placed Aughrim and Ballinasloe; beyond which, on the road to Athlone, is a very poor country. But, even in those parts where the soil is of the poorest quality, heath and fern, there is often to be found, near the surface, limestone-gravel, which, if used, would convert the barren soil into one of fruitfulness and verdure.

In Wexford, as has been already observed, there are very few bogs, except at the foot of Mount Leinster, but in Galway they abound; nor have they been drained and reclaimed as in many cases they might have been. Mr Bellew of Mount Bellew, Lord Clonbrock, Mr Burke of St Cleran's, may be named as the most spirited improvers of boggy land.

We are tempted to give an extract from Mr Nimmo's Report to the Commissioners for Improving the Bogs of Ireland, as descriptive of a great part of this county:—"The whole tract between Lough Corrib and the Atlantic Ocean, is frequently termed Cunnemara; and, for want of one general name, I shall sometimes call it so. It is, however, subdivided into three separate districts, which are nearly, if not exactly, conterminous with the baronial divisions. Of these, Cunnemara Proper, or the barony of Ballynahinch, is the most westerly, having on the east a line drawn from the head of Kilkerran Bay, by Lough Ourid to Shanonafola Mountain, and from thence along the ridge by Mamturk to the Killeny Bay; the remaining boundary is the Atlantic Ocean. The name signifies, 'Bays of the Ocean;' and, in a loose sense, is supposed to extend to Costello Bay. The remainder is again divided by a line from Shanonafola Mountain to the upper part of Lough Corrib. The southern part is the Barony of Moycullen, commonly called Jarconnaught or Western Connaught. The northern is usually called Joyce's country from the prevailing family name, or the half barony of Ross; the Isles of Arran containing the other half

barony. The eastern part of Jarconnaught, anciently called Irras Damnon, to the distance of four miles from the town of Galway, is included in the county of the town. This district appears, not undeservedly, to be considered as one of the least cultivated parts of Ireland. On a general view indeed, it appears one continued tract of bog and mountain, the quantity of arable land not amounting to one-tenth, perhaps not one-twentieth of the whole. Where cultivation has made the greatest progress, on the south shore of Lough Corrib, the arable or dry land is interspersed with extensive tracts of naked limestone rocks of a most desolate aspect; and it appears to be only after incredible labour that a few patches of soil have been won from the general waste. Nevertheless, such is the general fertility of these spots, and the value of the pasture amongst the limestone, that this land, even including rock, produces a rent of 15s. per acre, and where tolerably cleared, lets as high as in any part of the kingdom. The other parts of the district are, for the most part, bare moors, consisting of bog of various depth, upon a bottom of primitive rock, of difficult decomposition, and affording little soil; but several strings or beds of limestone run through the country, and are distinguishable by the verdure and cultivation which have taken place in their vicinity. Some conception of the present value of this district may be formed, from the following particulars: The population amounts to about 30,000, of which one-half is in Cunnemara Proper, two-thirds of the remainder in Jarconnaught, more than nine-tenths are settled along the sea coast. The inhabitants of the interior do not amount to three hundred families, and these chiefly along some of the bridle roads that have been made through the country. In Jarconnaught also, the population is either on the sea-shore or on the northern slope of the hills next the limestone country. In Joyce's country, the upland lands are uninhabited. The rental of the whole district I find to be about L. 50,000 per annum, of which the kelp may produce about L. 6000; so that the land averages at 2s. 7d. per acre. From this also should be deducted the value of some salmon-fisheries, and the export of turf. The profit rents may amount to about L. 25,000; so that each individual pays about L. 2, 10s.; but of this L. 2 only can be in money, the remaining 10s. arising from the sale by the

ıdlord of manufactured kelp. The soils of the three baro-
:s may be thus arranged:

Arable land, about . . .	25,000	
Bog, ...	120,000	
Mountain and upland pasture, .	200,000	
Rock, much of it limestone, .	5,000	
Total, .	350,000	Irish acres.

" Though the general improvement and cultivation of Cunne-
ıra would seem an undertaking of the most arduous descrip-
n, it is not without facilities which might, upon a candid
ısideration, make it appear a subject more worthy of attention
ın many others of the waste lands of the kingdom. The cli-
ıte is mild, snow being little known during the winter: the
:tle are never housed, the mountains on the north, and general
riety of surface, affording considerable shelter. The summers,
wever, are wet, and it is exposed to heavy easterly winds.
though Cunnemara be mountainous, it is by no means an
land country like Wicklow. At least three-fourths of Cun-
mara Proper is lower than 100 feet over the sea. Great part
Jarconnaught rises from the shore of Galway, in a gently
ping plain, to about 300 feet, at the upper ridge of which
:re are some hills of about 700 feet, and beyond them a lime-
ıne country extends to the edge of Lough Corrib, and but
:le elevated above its level, which is only 14 feet higher than
: sea; but Joyce's country, on the other hand, is an elevated
:ct, with flat-topped hills of 1300 to 2000 feet, interspersed
th deep narrow valleys. This district is nearly surrounded
the sea on the south and west, and the great lakes Mask
d Corrib on the east; the latter is navigable into the town of
ılway, and could easily be made so into the sea. Various
:at inlets penetrate the district, so that no part of it is distant
ır miles from existing navigation. There are upwards of
enty safe and capacious harbours, fit for vessels of any bur-
:n; about twenty-five navigable lakes in the interior, of a mile
more in length, besides hundreds smaller. The sea coast and
those lakes abound with fish. The district, with its islands,
ssesses no less than 400 miles of sea-shore. On Lough Cor-

rib, it has about 50 miles of shore; so that with Lough Mask, &c. there are as many miles of the shore, or navigable lakes, as there are square miles of surface. This extent of shore is particularly important, from its produce in sea-weed, either for manure or manufacture of kelp. The value of the last article, a few years ago, amounted to about L. 50,000. At present, from the low prices, it does not amount to above L. 16,000. There are extensive banks of calcareous sand around the coast, in almost every bay; and, in the interior, there are numerous beds of limestone, nearly all the navigable rivers having some on their banks. The supply of fuel is evidently inexhaustible.

"Cunnemara is very destitute of wood, a few scrubby patches only being thinly scattered through it. The country, however, possesses an extensive stool of timber; for, in almost every dry knoll or cliff, the oak, birch, or hazel appear shooting in abundance, and require only a little care to rise into valuable forests. Several bloomeries, which were erected about a century ago, consumed much of the timber, and copsing was afterwards neglected. The sheltered vales, navigations, and abundant water power, would form great advantages in the cultivation of timber. On the whole, it appears to me, that the improvement of this district, so far from being difficult and useless, is a thing highly feasible; and, if *vigorously* and *steadily* pursued, is likely to meet with fewer obstructions, and greater ultimate success, than perhaps in any other part of Ireland."

The limestone of this county contains various shells and petrifactions, and great varieties of marble, some of a beautiful black, like that at Angliham and Merlin Park, near Galway. Green marble is found near Ballinahinch, on the property of Mr Martin. Marl abounds in many places, and has been very successfully applied to mountain-land, previously of little worth. Indeed, the marl-pits which appear on the road between Ballymackward and Hampstead, bear indisputable testimony that it was formerly used in large quantities; and wherever its application has been suspended, the presumption is, that it is of bad quality. In Galway, as in Wexford, it is proved, that the application of animal manure, even in the smallest quantities, after marl, or combined with this calcareous earth, produces surprising effects.

After yielding a crop of wheat, marled ground, with an application of very small portions of *farm-yard* dung, yields the most luxuriant crops of potatoes.

With respect to limestone, which abounds in Galway, it will hardly be credited in *Scotland*, that any land proprietor would suffer it to remain untouched in places abounding with heathy mountains and bogs; yet we are told by Mr Dutton (who never minces matters in cases which deserve animadversion), that, near Marble Hill, on Lord Riverston's estate, where *fuel* is on the spot *ad libitum*, an extensive bed of limestone offers itself to the improver, which, although there is no other limestone within many miles, is not disturbed from its bed.

Galway, like Wexford, is deficient in timber. Though much richer in soil, and with every facility of manure, it frequently presents a wild and neglected appearance.

The natural appearance of the county of Wexford is extremely dissimilar, being without a single lake, having little turf-bog, and no mountain that deserves the name, except on the western frontier. The fences also are strikingly different, consisting of mounds of earth, with furze on the sides and tops, which, when well made, are impenetrable to beast or wind. Thorn-quicks are sometimes planted in the front of the bank, and then the fence is handsome. These banks, though unornamental in their usual straggling state, without thorns to occupy a permanent station, are very useful, the furze constituting the fuel of the poor, both for the use of the cabin and the services of the lime-kiln, and, during the years of their luxuriancy, affording shelter to cattle.

Thorn hedge-rows are, however, frequently to be seen in Wexford (though hardly ever plashed or trimmed), but very rarely in Galway, where the removal of stones from the field-surface is necessary to the progress of agriculture, and where their arrangement in dry walls is a matter both of convenience and utility. The want of gates in these mural boundaries is very obvious to the traveller. A car, plough, or *bush*, is the ready substitute to stop up a gap, when ingress or egress is required; and this latter *stop-gap*, when sufficiently dry, is regularly devoted to the use of the potato-pot, the gap being then either left wide open, or furnished with a *greener* bough, to be

burnt in its turn. In Wexford, iron gates are much in use; no respectable farmer is without them.

In Galway (as in Wexford), there are many small woods and plantations; but, on the whole, it exhibits a most denuded aspect. The houses of the peasantry, too, are of a very inferior description—mere mud cabins—sometimes without a chimney, and generally without embellishment. The cottages at Ballinasloe, Headfort, and the village of Mount Bellew, are to be, however, especially excepted. These are of a very superior kind; but, in ninety-nine cases out of a hundred, the habitations of the poor are very wretched, and far inferior to those of the same class of occupants in Wexford. The Galway hovels, like those in some of the Highlands of Scotland, are usually built with dry stones, and covered with heath. When built of mud (as is the case in Wexford), the walls are raised on foundations of stone, badly tempered and inaccurately formed, and the level of the floor is two or three feet lower than the surrounding surface. Sometimes the walls are composed of sods, piled up in a hasty and slovenly way.

Some landlords build good stone houses for their tenants. The estate of Lord Clancarty is superior to any other in the county. In this and other respects, his Lordship seems indeed to study the comfort of his tenantry. The state of Ballinasloe, where pigs have no chartered privilege to occupy the streets, to the annoyance of the better class of the inhabitants, is a proof of our assertion. This town presents a perfect model of cleanliness and order, from having been as dirty as Loughrea, or any other town in the province of Connaught. Its description, until the efforts of Archdeacon Trench, the brother of Lord Clancarty, undertook the task of reforming its condition, is thus graphically given by Mr Dutton. "When I first saw Ballinasloe, it was not outdone by even Galway in either filth or a vicious police. The doors of the houses were almost inaccessible through dunghils as high as the eaves of the cottages, and an uncontrolled ingress given to all kinds of vagabonds, male and female. In the day-time, in even the best part of the town, it was difficult to pass from one house to another, the footpath was so blocked up with cars, pigs, and other nuisances. In the night, you were obliged, from a regard to your neck or your

shins, to wade ankle-deep through puddle, in the middle of the street. Even here, you were lucky if you escaped a tumble over a pig or a large stone, or escaped a Scotch salute, without the Edinburgh caution of '*'ware heads.*' Now, what a contrast! the footpath well paved, and swept *every day*; not even a bowl of water permitted to be emptied into the streets *(what a hardship!)*; not a car, or carriage, even those of gentlemen, permitted to stand in the street *without horses*; not a dunghil or loose stone; every ale-house shut up at an early hour; not a shop open during divine service; vagabonds and idle women sent to Bridewell; the footpaths well gravelled for a considerable distance on every road round the town, and posts fixed to keep off the wheels of carriages, &c. All this, and much more, has been accomplished by a steady, yet discriminating, adherence to regulations calculated for the general good. They were at first violently opposed, as lately, in Galway, by those who, blinded by prejudice and old habits, were insensible to the blessings of cleanliness; yet they now seem to be sensible, that the health and comforts they enjoy, have more than compensated for the loss of any of their former imaginary and filthy conveniences. The change has been effected by a well-digested and *impartial* system of rewards and punishments; and I think the motto to Lord Clancarty's printed regulations might very justly be, 'The wreath or the rod.'"

Headford is rather a clean town, and with good streets and new houses, like those at Ballinasloe and Mount Bellew, free from the vagrancy of pigs.

Nor should the town of Gort be omitted. The demesne of Lord Gort is beautiful, and the whole country thence to Loughrea, in which are seen Roxburgh, Castleboy, Cool, and Cappard, is really fine!

Cunnemara, from its proximity to the Atlantic, can never be well-wooded. Mr D'Arcy, one of its proprietors, seems likely to improve it considerably. He has built the town of Clifden, which possesses great local advantages, and, owing to the proprietor's well-directed efforts, communicates by a level road with Oughterad, through the estate of Mr Thomas Martin, who is also a spirited improver.

Planting, however, in other portions of this county, as in Wexford, should be considerably increased.

Mr Lawrence of Bellevue has set a noble example, by planting between three and four hundred acres, but injudiciously as to the mode of treatment in the opinion of Mr Dutton, who complains of the narrowness of the screens, and the want of timely thinning. This gentleman, had his life been spared, would have greatly extended his plantations.

The circumference of trees which he planted, at 44 years' growth, three feet from the ground, was as follows :—

	Ft.	In.		Ft.	In.
Acacia,	5	4	Copper Beech,	5	4
Cedar of Libanus,	6	8	Evergreen Oak,	5	0
Scotch Elm,	10	0	Horse Chestnut,	5	9
Sweet Chestnut,	7	6	Scotch Fir,	4	4
Oak,	8	6	Ash,	6	1
Silver Fir,	7	3	Pinaster,	7	5
Weymouth Pine,	5	0	Beech,	7	5
Tulip tree (60 feet high),	5	10	Hornbeam,	6	2
Larch,	9	3			

If his views had been seconded during his son's minority, an *immense* property in timber would have been created. He planted, of oaks alone, at the distances at which they were to stand for timber, (with nurses between them), 100,000.

We find, in the list of proprietors who obtained premiums from the *late* (alas! that we should have to write the adjective), Farming Society of Ireland, for planting, the following gentlemen: Right Honourable D. B. Daly; Earl of Clanrickard; Sir Thomas Burke; Mr Lawrence; Mr M. Burke; Lord Riverston; Mr Charles Blake. The maximum of acres planted 141; the minimum 25.

"If the same spirit," observes Mr Dutton, "actuated the landed proprietors of this county, and I may say of Ireland, as those of Scotland, what a country would ours be!

"In that enlightened country (Scotland), probably more has been planted in that kind of ground by one noble proprietor than in the whole of Ireland. There they reckon by the *thousand* acres, here by the *acre*."

As the Wexford peasantry are far superior in moral civilization to that of the Western province, so are their dress, wages, and food of a better kind. The Wexfordians men and women,

(and generally children), wear shoes and stockings; the Galway females of the same class go barefooted, except on grand occasions.

The peasantry of both districts manufacture freeze and knit stockings. For their clothing there is, however, more cloth purchased from shopkeepers in Wexford than in Galway; we speak of the rural districts. The wages of the Wexfordian labourer are from 10d. to 2d. a-day without diet, or 6d. a-day under the cottier's system, with two meals a day. In Galway the highest wages, without diet, are 8d., and the lowest 5d. There is an extravagant charge to the poor labourer of the country districts in both counties from 30s. to 1*l.* for an acre or perhaps half an acre, *with leave to build a cabin for himself.*

In both counties sea-weed forms on the sea coast the manure for the farmer's potatoes. This in Wexford he mixes with sand, or the earth of a headland, or the scrapings of the road side, and applies it over the potato set in drills. In Galway he plants his potatoes on lazy beds, digs earth from the furrows, covers the potato, and then usually applies sea-weed on the upper surface. The scanty quantity of a great portion of the latter county and the wet nature of both, and probably rendered the use of the broad and narrow implements, and lazy beds, so general. In Wexford the absence of obstacles to the plough, the friability of the soil, and the comparative dearness of human labour, have given a preference to drills and horse labour. In both counties there are many small resident proprietors; the Leviathan ones are unhappily absentees from each, and much that would devolve upon the landlord, is executed (imperfectly of course) through the instrumentality of agents who are sometimes injudiciously restricted in their powers. Considered as a body, the proprietary of Wexford are in refinement greatly superior to that of Galway. In both counties, however, there are many of those, who seem to be merely rude consumers and: there are also many of the highest order of talents, and the nicest polish. We speak of them as a body, and as such the Connaught gentry are much inferior to those of Leinster. The drinking and fighting, which used to characterise the Galway gentry, are, we trust, rapidly ceasing to distinguish them. The march of intellect is among them, and the habits of reckless ex-

travagance, which marked their parents, will doubtless be succeeded, in the existing and future generations of Galway gentlemen, by the more laudable desire of economizing their resources for the improvement of their estates, and the advantage of their own families. In each county there is a woful want of ameliorating crops of artificial grasses, but in a lesser degeee, however, in Wexford.

It remains only to touch upon the trade and fisheries of each county, and the habits of the people employed in them. The trade of Wexford, which has a bad entrance to its harbour, is greater than that of Galway with its noble bay: the Wexford merchants are a wealthier body,—alas! when we think of what Galway was, we cannot forbear a sigh on the mutability of human affairs. This town was once of considerable mercantile importance; the very name is derived from words importing trade; it is said that a single house, which would now let for L. 50 per annum, was mortgaged, at a period when the export trade of Galway was at its highest point of opulence, for L. 14,000.

The population is, we believe, above 40,000; of these a lamentable number is in a state of pauperism. The annals of Galway are carefully preserved from the year 1280, and afford most interesting details. It was once a great depot for Spanish wines.

It is matter of regret that Galway is now more remarkable for the filthiness of its streets than for the wealth or elegance of its inhabitants.

The town of Wexford employs a considerable number of hands in fishing. These men are among the most active, sober, and cleanly persons in the long suburb of the Faythe. Gardens are attached to all these houses, and these, divided by scarcely perceptible boundaries, occupy the time of the fisherman which he does not employ in fishing. These houses are all white-washed both inside and outside, and present the neatest possible appearance. There are but two or three harbours for fishing boats on the Wexford coast. The quantity of fish is not very considerable: soles, plaise, cod, gurnet, mullet, hake, and herrings, and occasionally turbots, are taken, but they are not always abundant. The deep-water fishing is not attempted. The boats are of a small class, and are never seen outside the harbour except in fair weather. They are, however, always *disposed* to

go out whenever there is a prospect of taking fish; and do not play the parts of drunken beasts when they return home.

In Galway (the population of which is 33,120) the people of the Claddagh suburb (in English a dirty place), who are in number about 3000, though they have been greatly improved in cleanliness, are a wretched class in most respects. They speak no other language than Irish, seldom think of educating their children, and, when unemployed in mending their boats or fishing, spend their time in drinking or lounging about, and leave all household and other land employments exclusively to the women. They, however, shew their judgment in one point; knowing their besetting sin, they never take *whisky* to *sea*. On St John's day they elect their own Mayor and Sheriffs, to whose decision they are more amenable than they formerly were to municipal authority of a more legitimate character. The quantities of fish which they take, and the still greater, which, from indolence and other causes, they do *not* take, are enormous. The quantity of herrings, as well as of other fish annually taken in the Bay of Galway, is very considerable; but, by some extracts which we shall here give from a number of the Galway Weekly Advertiser, published a few years ago, it would appear that the indolence, the ignorance, and the superstition, of the Galway fishermen are excessive.

"We may consider that our herring fishery is over for this season; our boatmen would not go out until the take was over every where else, and now that the weather is broken and the nights getting long, it will be impossible for the miserable craft they make use of to stand the heavy seas on this coast. These unfortunate people cannot be persuaded that it would be wise to take herrings during the fine weather in the months of May, June, and July; and even last week, although the weather was favourable, they staid at home. Monday, 4th September, being the fair-day, they would not go out, and having got drunk, they lost the whole week. In any other part of the world the boats would have gone out on Sunday night, and would have three or four thousand pounds worth of fish to sell at the fair, and by that means have kept a large portion of the money received here on that day, in the town, as many persons from the country would have taken home a boat of fish. We have long

deplored the loss we sustained for want of a protecting force for the peaceable fishermen of this bay, but it seems in vain: although we have Commissioners of Fisheries, with all their subordinate officers, aided by new acts of Parliament, still the *pirates* command the bay, and prevent this town and neighbourhood from enjoying the blessings of a free fishing. When we had Captain Morris stationed here, he protected the fishery, and such persons as wished to go out every night were secured against assault; the consequence was, that fish in the greatest abundance were taken, and many square-rigged vessels were loaded, and wealth flowed into the town, and no fish were imported here that season; every shop was full of business, and the demand for excisable goods was very considerable, and the whole population of the town one busy scene of industry."

It appears that a combination existed among the Galway fishermen, who, besides the fifty-two Sabbath days, rigidly observed 60 saints' days as holydays, and would neither catch fish themselves nor let fishermen from other places attempt to do so; they assaulted the crews, and broke the nets of all strange boats, as if they had an exclusive right to what the Divine bounty had sent to their coasts. These ruffians are the persons alluded to as *pirates* commanding the Bay of Galway,—crime accompanying their indolence and superstition. In another document it is thus observed: "The wealth that Scotland annually acquires by her fisheries is one of the main sources of the prosperity of that country, and at this moment there are several boats from Ireland fishing on the coasts of Caithness. That every species of fish may be found in the Irish seas in equal abundance, is certain; but saints'-days, superstition in its most hideous aspect, and mismanagement of every kind, seem to encircle Ireland with ignorance, poverty, and distress." The herring fishery is not carried on to that extent it ought, and in general is greatly mismanaged; there is almost always something wrong or wanting. At one time there is a want of salt to meet an extraordinary take of this valuable fish; at other times the nets are out of order, or the boats leaky, with a variety of other circumstances, proceeding often more from want of capital than of good management or industry. It has frequently happened, but from want of salt, immense quantities have been thrown on

the sea shore and left to rot; sometimes a boat-load has been sold for 1s. 6d.! Herrings begin to be sold frequently at a guinea a thousand, and when the vessels are full, or salt scarce, for 15s. What a field is here for capital and skill! To fish with the full effect for herrings, it is necessary to have two sets of nets, as the meshes of those used for the spring fishery would be too large for those used in summer, and the fish would all go through, whilst those for the summer fishery would be too small to mesh them in spring. In the winter and spring fishery the boats usually employed are so small, that the boatmen are afraid to venture where they are most likely to catch fish. The usual method on this coast, and throughout Ireland, is to let down the nets for the fish, to mesh themselves, whilst on the western coast of Scotland, the nets are drawn against the scull of herrings, by which means a boat is immediately loaded. On inquiry in Galway why this beneficial practice is not adopted, it is answered, "It would disturb the fish, and they would leave the bay." It seems the Scotch herrings are not so easily offended as the proud Connaught ones. When the herring fishery begins at Galway, almost the whole male population of the neighbouring villages run to the shore to assist, and have a certain share, amounting sometimes to a guinea or more for one night's work. The small row boats that are generally used along the shore frequently take upwards of 20,000 herrings in a night, which sometimes sell for L. 1, 7s. per thousand; and they often make two trips if the fish are in abundance and near the shore. Sometimes several men join in a boat and nets for this fishery, many of them tradesmen of different branches, who at this period abandon their proper calling, in which case they have an equal share of the produce, according to the proportion of money they have contributed: sometimes the boat and nets belong to one person, and are hired out: the owner gets a clear half, and the remainder is divided amongst the crew. When not employed in fishing, they are usually occupied in gathering sea-weed for manuring ground, for potatoes, or for burning for kelp. During the season for catching herrings, all other fishing is almost abandoned: consequently, other kinds of fish are then scarce in Galway. Five thousand are reckoned a middling night's take of herrings for one boat; all they get are sold to

supply the home demand, which is so far from being answered, that many cargoes are brought from the north-west coast. The fishermen say that the quantity of fish has decreased for the last fifteen years, but this may in some measure be imputed to their not being aware that the fish are often to be found in great abundance far below the usual depths at which they are generally fished for. This has been ascertained by an accidental breaking of the rope to which the corks were attached, which caused the nets to be carried down by the weight of the leads to a considerable depth. Before this fortunate accident happened, scarcely a fish was caught, but to their great astonishment, when brought up, the sunken net was so loaded with fish, they could scarcely with safety bring it into the boat. The approach of the herrings to the Bay of Galway, is known by various signs, such as the appearance of vast numbers of those fowls that feed on herrings, and by their making an unusual noise; also by a great take of cod-hake or black pollock, which follow the herrings, as well as by the luminous appearance of the sea at night, and by other signs known to the fishermen. When the appearance of the fish has been ascertained, the *Admiral* of the fishermen sends dispatches to prevent all the boats in the bay from going out until his permission is obtained. Any persons presuming to act contrary to his orders, are punished with the loss of boats and nets, and probably a sound drubbing. When it is his pleasure, an evening is appointed, and all the boats in the surrounding bay assemble at the Cloddagh, or meet them on the way, to the amount of 500 or upwards, and all sail out together, and preserve a profound silence until they arrive on the fishing-ground. Upon a signal given by the Admiral's boat, they all at once drop their nets. As the great scull of herrings divide shortly after they enter the bay, and fill every creek and inlet of it, much time is lost by this nonsensical and tyrannical parade; for it is well known by the owners of small boats in those creeks, many days before the Admiral signifies his high and mighty pleasure, but they dare not fish.

On the same coast is an oily fish, called the basking-shark or sun-fish, which produces from four to twelve barrels of oil, that sells from L. 4 to L. 5 per barrel: this fish is of a harmless nature. This species of fishing might be greatly improved and extended:

by employing larger vessels to pursue the fish at a distance from shore, for the best remain in deep water, out of reach of the small wherries used in that district, though lesser boats would be also necessary to bring the liver (from which part alone the oil is extracted) ashore while fresh. The sun-fish liver produces four to seven barrels of oil, some as high as eleven or twelve. The taking of sun-fish begins about the middle of April, and is considered to be over by the 1st of June, though great sculls of them have been seen so late as July and August. By industry, with proper appointment, great profit in this branch of fishing might be acquired, but it is all grossly mismanaged: even the spears and harpoons are often rusty or so bad, that the fish when struck escapes altogether; yet with many deficiencies, oil has been sold from fish caught on this coast, in one season, to the amount of L. 5000 *.

The Bay of Galway abounds with fish of various kinds, and there are probably 500 fishing-boats belonging to it, the size of which has increased to 14 tons: formerly they seldom went beyond the islands of Arran, and on the appearance of a squall were obliged to leave their fishing ground; one man, on removing farther into the Atlantic than usual, lost almost all his lines by the weight of fish: a sure indication that deep-sea fishing with large vessels would be very lucrative. Steam vessels will probably, at no great distance of time, be employed in fishing, as calculated to run out to the proper depths in a short time, and to return against wind or tide when necessary. These vessels, stopping their machinery, could either remain stationary or use sails, while actually employed in the fishing.

The Cod and Ling Fishery commence on the western side of Ireland, at various intervals from the 1st of February, every year near the shore, where it is considered they come from the bank that lies seven or eight leagues from the land, and where they

* Dr Stokes says, in his admirable "Observations on the Population and Resources of Ireland:"—"These shores afford an inexhaustible mine of wealth,—a fresh harvest at every season, without tillage, seed, or manure,—free of rent, tithe, or taxes. Many acres of that sea are more productive of nutritious food than the same quantity of moderate land, and require only boats, nets, and hardy hands, to reap the never-failing crop which Providence has supplied."

are considered always to be found; it stretches along the north-west coast of Ireland. The quantity that might be killed on this bank is beyond calculation. The number of ling exceeds that of cod in the proportion of five to one. When any of the Cunnemara boats (which is but seldom) have ventured out on the bank, in a few hours, with their hand-lines alone, they have filled their boats. In the year 1815, in the month of March, a boat from Cunnemara, with only two spillards, in one day brought in thirty-six dozen, killed near the land, very few ling amongst them. Their hooks were so very small, and so unfit for heavy fish, that they lost nearly a fourth part of them. Another boat with one spillard in one day brought in 160 ling and 2 cod. Last summer a boat with one line and one hook brought in nineteen dozen, and would have killed more, had they not, alas! lost their *only hook*. Also in the same year (1815) some Galway boats of seven or eight tons burden, that were better appointed, returned, some on the fourth, others the fifth day, loaded with split cod and ling, not being able to carry the quantity they had unopened, and having no salt for curing them. Last summer, and the summer before, a man came from Malbay, in the county of Clare, in his horse-skin boat: he killed more fish than any six Cunnamara boats; as fast as he filled his boat, he came ashore and sold them, as they were killed near the land. Hence it may be computed that a good wherry, and crew well appointed, would kill ten times as much as any of the common boats do, and that each of the wherries would kill and cure forty tons for exportation, and to which they would not be confined, having always the Galway and Westport markets open, and particularly in the spring of the year, when fresh fish sells well.*

The great fishery which supplied Europe before the discovery of Newfoundland was in the Atlantic, several leagues from the Irish coast, and there immense quantities, it is to be reasonably supposed, might be still obtained. These banks have not been fished for 300 years, and this fishing seems peculiarly to belong to Ireland and Great Britain. Our vessels might be fitted out in the beginning of spring with all materials, and be employed from March to the middle of May, and they would run to Kil-

* For all this local information we are indebted to Mr Dutton.

libegs or Lewes, in case of stormy weather beating them from the banks.

When the cod and ling fishery ceases by the middle of June, they might repair to Shetland, and fall in with the shoal of herrings, and follow them down the west side of Scotland, before they begin to subdivide in our channel; by which means they might be caught in great numbers in their prime season. This appears to be more rational than waiting for them until they come to our harbours, sickly and reduced. Much of our fishery too, might still be carried on with small boats. Experience would soon fully inform the fishermen of particulars to guide them in future seasons; such as the length of time during which fish stay in particular places, and how they are affected, or induced to alter their resting-places, by adverse winds, and by fish of prey; and, above all, the fishermen might learn at what depths to shoot their nets, whether near the bottom, or the surface of the sea, a point which seems very imperfectly understood.

The Galway females of the peasant class are fond of red petticoats and flannel or freeze jackets. The Wexford ones of blue striped linsey. But there is another much more distinguishing and important mark between them. In Galway, the Irish language is in very general use; so much so that, in many districts, English is hardly understood. In Wexford, Irish is totally unknown.

We may close this article of comparison between the two counties, with an assurance to our readers that the western division is at least a century below the eastern in general civilization and knowledge. D.

ON THE FOREIGN CORN TRADE. *By Mr Isaac Dimsdale, London, Editor of the Universal Corn Reporter.*

In giving an account of how the corn trade is conducted in different parts of the world, a considerable detail must necessarily be introduced. I shall begin by stating the mode in which foreign corn is obtained.

As the celebrated report of Mr Jacob is always quoted on this subject as the "highest known authority," I shall probably

be deemed presumptuous in expressing my opinion that his report is in many instances *very erroneous*, and I account for it in this way. The letters of introduction, &c. which a gentleman going out on a special mission from the British Government would take with him, would be addressed to men of the *highest rank and station*, who, from this very circumstance, could not be supposed to possess a correct knowledge of the details of trade; for if, in this enlightened country, where a nobleman and a merchant are so nearly on a footing in society, it is frequently amusing to witness the singular ignorance displayed by *large landed proprietors* of the corn trade, what must be the case in countries where civilization has not reached to nearly the same height? How could these people in high rank abroad give Mr Jacob the requisite information? But I attribute the incorrectness of Mr Jacob's report principally to his ignorance of the German language, the acquisition of which must be indispensably necessary to obtain correct information. People are very jealous of *writing down* aught by which they might commit themselves; but in colloquial intercourse round the table or elsewhere, the most useful hints are occasionally thrown out, where often "more is *meant* than meets the *ear*." Mr Jacob's not possessing a knowledge of the German language lost him many valuable opportunities of improving the advantages which, to a certain extent, he undoubtedly possessed in a pre-eminent degree.

As *Danzig*, *Konigsberg*, *Elbing*, in fact, *Poland* generally, exports more wheat than any other part of the continent, a short statement of how the trade is carried on at these ports, may serve as a guide to the foreign trade generally. And, in the *first* place, it may not be improper to mention the mode of cultivation practised in *Volhynia*, one of the principal districts for supplying those markets, and from whence the finest wheat comes.

The population consists entirely of slaves, and either the proprietor farms his own estate, or lets it to what are called "Possessors," at the rate of so much per day's labour, calculated for the peasant; thus the proprietor receives so many days' labour, or rather he receives so much money for each day's labour of the slave. There is a greater number of days' labour imposed on some than others. Suppose there are 1000 slaves on the es-

tate, a calculation is made out of that number how many days' labour they are to perform during the year for the proprietor. A census is then taken of each person and family, which is put into the hands of the "possessor," who exacts so many days' labour from the peasantry, and thus pays so much per day's labour as the rent of his farm to the landlord.

This rotation of crops is followed; 1*st*, wheat; 2*d*, wheat and rye; then barley and oats; and after that the ground lies fallow. The capabilities of the soil are most extraordinary; and some idea may be formed of the number of acres under cultivation, when I state, that from Riga alone the following quantities of grain constitute only one year's exportation: Wheat, 200,000 quarters; Rye, 1,350,000 quarters; Barley, 75,000 quarters; Oats, 101,000 quarters; and from 20,000 to 25,000 tons of Flax, besides the vast quantity of corn which is eaten by vermin, wasted by exposure in stacks, and destroyed for want of a demand. It is no longer, then, a matter of surprise that corn can be produced at so exceedingly low a rate in Poland, Russia, &c.

It was stated in evidence by John H. Lander, Esq. before the House of Lords in 1827, that wheat had been selling in Volhynia at *7s. and 8s. per quarter!* but that the proprietors of land would be *well satisfied* if they could obtain 12*s. per quarter upon their estates!* What do the advocates of free-trade say to this? unless, indeed, they wish to drive all our land out of cultivation to benefit the foreigner.

Taking, then, the maximum price of 12s. per quarter as our guide, we shall see what the wheat will cost, brought to and landed in London via Danzig. The Prussian and Polish landlord employs a broker to dispose of his wheat at Danzig, for delivery the following spring, generally considered "the 15th of May" in the wording of corn-contracts on the continent; but, of course, this depends on the breaking up of the ice, or, as it is termed, "first open water." From the territory of *Volhynia*, the wheat is conveyed down the River *Bug*, which joins the *Vistula*, and thus reaches *Danzig*. The expense of this transport, owing to the great distance, is from 9s. to 14s. 6d. per quarter, making the cost when warehoused in Danzig 26s. 6d. per quarter, or, to use the words of a Polish proprietor, "If I could always reckon on obtaining 26s. per quarter for my wheat

delivered at Danzig, I and my neighbours *would be perfectly satisfied.*" The merchant who buys the wheat, either stores it on speculation, sells it at a certain price, free on board a vessel, or ships it on consignment to a corn-factor in London, or any other port where he imagines it can be sold to the best account. The expense of freight and insurance varies according to the season of the year, scarcity of vessels, and other causes. At present the rate is only 3s. 6d. per quarter, with 10 per cent. " primage" or gratuity to the master, frequently designated " hat-money," and the insurance is 15s. per cent. On arriving in London, the cargo is entered " in bond," unless intended for immediate sale, when the duty is forthwith paid, and the cargo sold and delivered to the buyers direct from the vessel.

If landed, an expense of 7d. per quarter for lighterage is incurred, and about 8d. per quarter city-dues for metering the corn; this work being performed by sworn officers, appointed by the Corporation, and who alone can measure grain out of any vessel arriving in the port of London. Several attempts have been made to do away with this *monopoly*, but ineffectually. It is certainly an improper state of things, that a man may not employ *his own workmen to take his own corn out of his own vessel*; but such *is* the case *in London, and in London only*, I am happy to say.

When the wheat is landed, the granary rent immediately commences at the rate of 5s. per 100 quarters per week. " Turning and screening," should the corn lie long and require it, are 7s. per 100 quarters; and there is, lastly, an expense of about 4d. per quarter *again paid to the corporation* for re-metering the corn out of granary. The expenses of sale in Mark Lane are 1s. per quarter, and 1 per cent. for guaranteeing the debt, *which all London corn-factors do*, they never acting in the capacity of brokers. The credit given is one month, consequently the nett proceeds are due in cash one month from the date of sale; but the foreigner generally re-imburses himself by drawing a bill at two or three months' date, when he hands the bill of lading of the wheat for about two-thirds of the probable nett proceeds, and the balance is either remitted, or a bill at sight drawn by the shipper for the same.

A good deal of corn is changed against ducats; the ducats

are, in general, coined in Holland. The bankers in Hamburg and the bankers in London do the business on joint account; they send those ducats to Danzig and Konigsberg, and against them they get bills upon London, sometimes at two or three per cent., sometimes at one per cent., and through that medium they thus get a market for their bills. The people in Poland generally take gold or ducats; these ducats are in general new Dutch ones, and they go there at a particular value, about twenty-eight guilders.

The next principal market for grain to Danzig, as regards an export trade to England, is *Hamburg*, that being a considerable depot for the corn grown on the banks of the Elbe and neighbouring territories. When a sufficient price can be given, barley is sometimes sent to Hamburg from *Bohemia*, in which province some of the finest quality is grown; indeed, it is fit for malting purposes, and always commands a preference in the London market. To the agricultural reader, it may not be uninteresting to learn how tillage is conducted in those districts which are at a comparatively short distance from us.

Instead of a plough in the Duchy of Mecklenburg (to which I shall principally confine myself) an instrument called "hacke" is usually applied. It is merely a broad coulter, somewhat curved at the bottom; hence the tearing up of the soil is not called ploughing but "hacking." In fallowing, the land is hacked four times; namely, in autumn, in June, in July, and the fourth time in September or October. The first hacking is called the stubble furrow; the second, the fallow furrow; the third, the turn furrow; and the fourth, the seed furrow. For barley, which follows after the winter corn, the ground is furrowed three times, viz. in autumn the winter furrow, in April the turning furrow, and in May the seed furrow. For the oats, which follow after barley, the land is hacked twice, first in autumn, called the turn furrow, and the second in May, called the seed furrow. Peas, when sown in the first course after the winter's corn, are furrowed twice; when sown in the second course, three times. Beans are not much cultivated; the soil, qualified for their growth, not being abundant in that country. Rape requires five courses, or one time more than wheat and rye. The harrow is applied each time after

the tearing up of the soil with the hacke. A good soil is usually harrowed, first with an iron-tined, and afterwards with a wooden-tined harrow. With the latter the land is generally cross-harrowed, that is to say, in an oblique way, on patches of ground of about two rods in width. The rollers are particularly applied in the turn furrow (April) for crushing the clods. Some agriculturists use also the roller after sowing, for the purpose of making the soft soil either more solid, or crushing the clods on the strong lands. Others prefer to have the clods that are found in the seed-furrows broken by the hands of labourers. On the lands which are neither too loose, nor liable to form into clods, the roller is not generally applied.

A labourer can mow and bind in a day, of wheat $1\frac{88}{100}$ acre; of rye $1\frac{78}{100}$ acre; of barley $1\frac{79}{100}$ acre; of oats $1\frac{99}{100}$ acre. However, the space of land which can be mown in a day, by one labourer, depends very much on the strength of the corn itself; and the expense of mowing ought, on that ground, to be calculated rather in the proportion of the quantity of produce than the extent of surface. The binding is generally done by women, the shocking by men. The rye is usually bound together behind the scythe; the female binder following immediately after the mower, a method which is not practised with the other sorts of grain. On some estates, this mode of binding the rye, close behind the scythe, has been done away with.

The value of 100,000 Mecklenburg roods, equal to $536\frac{15}{100}$ acres of land, of medium soil, with suitable buildings, and sufficient wood belonging to it, is L. 4082 : 9 : 0 Sterling. An estate of 1834 acres has recently been sold for 82,000 dollars, or L. 13,960 Sterling, which is in equal ratio to the above valuation. The taxes on this estate amounted to L. 13 : 19 : 10 Sterling. On an estate of 1152 acres, I have been furnished with the following particulars of taxation, which may be deemed interesting:——

1. Church-rates, clergymen, repairing the minister's house, and conveyance of materials, ...	L.	9	18 2
2. Insurance of the building implements and live stock against fire, also insurance of the crops against hail, .		17	1 9
3. Repairs of bridges, roads, ditches, and canals, . .		3	8 6
4. Support of the poor, ...		7	13 5
School tax, about		7	13 2
	L.	45	15 0

The extent of estates varies from 320 to 2850 acres. Such estates are managed in one farming establishment; but there are others of a still larger extent, arising from the annexation of smaller estates to the principal ones.

There is a novel kind of association established, called the "Board of Hypothecation," where each estate has its hypothecation-book deposited. In this book all the mortgages with which the estate is encumbered, are inscribed. This system has the effect of giving a full and clear view of the state of incumbrances on the estates. Besides this institution, a *credit verein* (credit association) has been formed, to which a considerable part of the proprietors of the estates of Mecklenburg belong. The estates which thus belong to this association, are mutual guarantees for half the amount of the taxed valuation, when that sum is borrowed upon their security. The directors of this association issue transferable bonds, bearing 4 per cent. interest, but the landholders pay ½ per cent. more, or 4½ per cent., from which the expense of administration is defrayed, and the remainder is applied towards forming a reserve fund.

Wheat can be produced at 25s. per quarter, on an average of late years. I say *of late*, because from the year 1796 to 1808, wheat often sold *there* at 9s. per bushel, and even more! The expense of receiving wheat into store at Hamburg is 9d. per quarter, and the granary rent, so long as it remains there in warehouse, is 2d. per quarter per month. The expenses of freight and insurance are in general about half those from Danzig; sometimes even less. When the traders (who sail at stated periods *full or not*) cannot get a cargo, I have known the freight as low as 1s. per quarter. The other charges are precisely the same as those already enumerated.

Of late years a considerable trade has been carried on with *Odessa*; but the immense distance will always militate against a very large importation direct from thence. Much business has, however, been done by means of shipping to Malta, Gibraltar, &c. taking out and cooling the cargo, if requisite, and then reshipping it for England.—As some may not know the

meaning of "cooling," it is necessary to state, that many cargoes have been so heated on the voyage, as to render the pick-axe necessary to get the wheat out of the ship's hold, and in several instances the whole has been thrown overboard by permission of the Board of Customs, or burnt for manure, as it would have endangered the safety of the warehouses, from the intense heat which it engenders; for, even spreading out heated corn on a floor three or four inches thick will not cool it. Independently of the length of voyage from Odessa, there is another circumstance attending the trade there, which forms a considerable impediment to it, namely, that the money must be advanced to the growers before harvest, or they will not send it down to Odessa, the expense being so heavy, and the confidence in that country so little; but I believe the merchant is mostly the sufferer, as the farmers frequently pocket the money, and never send the wheat.

I should mention, that a good deal of wheat is shipped from Odessa to Malta, where it is landed and stored in the *Rock*, and then hermetically sealed, the advantages of which are these, that any worm in the wheat rises to the top and dies; and if the wheat is put into the Rock in good condition, whenever it is removed the condition will be equally sound, and the expense of keeping it is only one per cent. per annum. In case of any demand arising, the wheat is within a reasonable distance, and can be forthwith shipped off, which is of course a great convenience to the owners.

Having thus given a summary statement of how foreign corn is cultivated and sent to England, it may not be uninteresting to many to know a little more of the details of the trade. And, in the *first* place, to describe how grain is brought from the interior to the shipping ports. In Russia, Prussia, Germany, Poland, &c. where the estates lie contiguous to rivers, the corn is sent down them in flat-bottomed barks or barges; but the navigation is frequently very dangerous, and at all times precarious. In winter, the rivers are subject to great inundations on the breaking up of the ice; and in summer they are sometimes quite unnavigable for want of water. These causes, preventing supplies from coming to market, occasionally produce a considerable advance in the prices. The river Dnieper has

many cataracts and shallows, so that barks can pass for a very short period only in the spring, and those only of a small size. Consequently most of the corn that goes to Odessa is sent in carts, carrying about 5 quarters each. These carts are drawn by oxen, and they travel in parties of 100 to 150. The oxen are pastured during the night, and they take advantage of the time when the peasantry are not occupied with the harvest; so that the proprietors can send their wheat 300 or 400 miles at a very trifling charge. *These districts might be cultivated to almost any extent, should an increased demand for grain arise, and the soil is what is termed "virgin land," requiring no manure whatever.* The wheat is generally dried in the sun at Odessa, before shipment, which is a far preferable mode of drying, in respect to that grain, to kiln-drying; but, as I have before mentioned, even this will not entirely preserve it from heating, for I never knew a cargo to arrive direct from thence without sustaining more or less injury on the voyage, which is the reason why the Mediterranean ports are made depots for Odessa wheat. From the Baltic ports corn is generally shipped from May 15th to the end of October, and sometimes later.

As respects quality, the finest Wheat in the world is grown in *Volhynia*, and shipped from *Danzig*, *Elbing*, or *Konigsberg*. The peculiarity of this wheat is the little bran it yields, which makes it much sought after by the English (but more especially by the London) millers. It possesses, likewise, a surprising degree of whiteness, and yields more *farina* than any other sort of wheat, not excepting the finest Essex or Kentish. This superior description is denominated "fine high mixed;" almost all the Danzig wheat coming *mixed*, in proportion to the quantity of *red* wheat, so much lower are the quality and value of the article. The general proportion of ordinary runs is one-third white to two-thirds red. The different denominations are, "finest high mixed;" "good and fine mixed;" "ditto, adapted for Scotland and north of England;" "red mixed," and "ordinary and light;" the first weighing from 61 lb. to 63 lb. per bushel, and the latter 56 lb. to 57 lb. per bushel. The difference in price varies from 10s. to 15s. per quarter.

In the Mediterranean, there is some very fine white wheat grown, both "soft" and "hard." A considerable importation

took place from Genoa, Naples, &c. a year or two since, which was freely purchased by our millers, at high prices; but this description of grain is principally used for making *maccaroni* in Italy and France, and is not exported unless a better price can be obtained for it elsewhere, which is not generally the case.

The most inferior wheat comes from *Riga*. It is extremely small berried, of a dingy red colour, and full of little black seeds. There is, however, some of better quality, but the generality is of an inferior description, and the price obtained for it is proportionally low, being 10s. and 15s. per quarter, under the finest *Danzig*.

There is occasionally an import of wheat from *Canada*, the *United States*, &c.; but the supply principally comes to Liverpool, and in the shape of flour, of which a very large quantity annually arrives. The duty on wheat from the British colonies is only 5s. per quarter, and on flour 3s. 6d. per cwt.

During the present year, I had a consignment of wheat from *Van Dieman's Land*, the quality of which was very superior, as may be supposed, when I readily obtained 8s. per bushel for it. I should, however, remark, that a portion of it which was sown on one of the finest farms in Bedfordshire, would not grow; and I am informed, that scarcely any wheat was ever known to vegetate in this country that had crossed the line, unless particular care be taken to preserve it from the effects of the atmosphere.

The best red wheat comes from *Stettin*, *Rostock*, *Wismar*, &c. This grain is very like English wheat, and when it arrives in good condition, is much esteemed, especially when we are visited with a "dripping harvest," it being then almost indispensably necessary to mix with our new corn, in order to render it fit for grinding.

The finest Barley comes from *Bohemia*, *Silesia*, and the banks of the *Saale*, by which river it is transported to the *Elbe*, and thence to *Hamburg*. This barley will frequently malt as well as English; but nearly all other continental descriptions are only fit for grinding, being mostly of very light indifferent quality. The greatest quantity is grown on the *Danish* islands; but there is a good deal shipped from *Danzig* and *Konigsberg*. The value at present in those ports is 12s. 6d. to 14s. per quarter.

Beans are not cultivated to a great extent; but from *Denmark* a tolerable quantity is annually exported, the quality being pretty good. They are generally of the harrow-tick description; but sometimes "Heligoland" or small pigeon are exported, which obtain high prices. The *Egyptian* beans are of a very peculiar red colour, occasioned by the intense heat to which they are exposed when ripening, in addition to which they generally become very heated on the voyage, insomuch that whole cargoes have been totally destroyed. They were formerly an article of great speculation; but the consumption of beans has much decreased of late, in consequence of the comparative cheapness of oats; so that very few are now imported direct from *Egypt*, but occasionally some come from *Leghorn*, *Marseilles*, &c. where there are magazines of them, as of *Odessa* wheat. Their value in those places is at present 16s. per quarter.

Although we were originally indebted to *Prussia*, it is supposed, for our best stock of blue Peas, the cultivation of them is not now carried to any great extent, but we occasionally get from thence some fine white *boiling* peas. Their present value is about 21s. or 20s. per quarter, free on board.

Rye is grown to a very great extent in *Poland*, principally for home consumption; but there is likewise a considerable export trade, chiefly to *Newcastle*, where a large quantity is annually used, the quality being generally very fair:—present shipping price, 20s. to 22s. per quarter.

Buckwheat, or brank, is grown to some extent in *East Friesland*, *Denmark*, &c. and was formerly much esteemed here for distilling purposes; but *barley* has latterly been so extremely low in price, that the distillers have preferred purchasing this grain on the spot, to incurring the risk of a voyage in importing *buckwheat*. This grain may now be purchased at *Hamburg* at 16s. 6d. to 20s. per quarter.

Tares are shipped in quantities from the *Danish* islands, where they can be produced at a very reasonable rate, say 15s. to 17s. per quarter.

The finest heavy Poland and potato Oats are grown in *East Friesland* and *Holland*. What are termed the "*Dutch Brew*," oats seldom weigh less than 41 lb. to 42 lb. per bushel, and

often much heavier. The *Archangel* oats are of quite a different description, being extremely thin skinned, sharp, long, and of a bright yellow colour. Post and coach masters are very partial to this corn, as it has little husk. *Riga* and *Petersburg* oats are somewhat similar, but they do not generally weigh so heavy as the Archangel, neither are they so bright. The cause of this brilliant yellow colour, is the intense heat of the weather during harvest. In *France* is grown a peculiar grey-coloured oat; but generally much corn is not exported from that country, as they consume their own growth. Occasionally, however, great quantities have been sent over, for I never yet knew foreigners refuse to ship corn to this country, if they could only obtain a good price for it. They will live on husks or any thing, and part with nearly all their grain; *but only for a consideration.* *John Bull*, on the contrary, will have a bellyful of the good things of this life; at any rate he goes upon short allowance with a very bad grace.

The manufacture of *Oil Cakes* is carried on to a great extent in *Germany*, *Flanders*, *France*, and *Holland*, from whence the English graziers and farmers are principally supplied; indeed, occasionally, the English crushers import foreign cakes, and *re-press* them through their own mills, extracting a considerable portion of oil therefrom; and then they form them into a "town made shape," and sell them as "*home manufactured*," which, in point of fact, they really are.

To conclude this outline of the manner in which corn is produced abroad and shipped to this country, it remains only to remark, that all the principal shippers of corn in the Baltic are also shipowners; consequently they keep their vessels employed in transporting grain, seeds, or oil cakes, which they do at a more moderate freight than an English captain will engage for. But so much more esteemed are an English master and his vessel, that frequently more freight is paid them by the merchant here in preference to shipping in a foreign bottom. The Englishman will frequently make the voyage in half the time that a foreigner can, and sometimes even arrive before, or as soon, as the bill of lading, and thus save the expense of insurance, which, from the distant ports, is frequently very heavy. If I made a choice, I should always prefer Scotch captains; they are generally shrewd, push-

ing fellows, and I need not say how much dependence may not be placed on an active, honest, and clever master of a vessel to go a long voyage to a distant port, where the purchaser of a cargo is at the mercy of a man many miles distant, who, as he takes care to get paid for the corn before it arrives, is not always very particular as to its quality. One of the smartest men for navigating the North Sea I ever knew, was *Mitchell*, of the "Union" of *Aberdeen*. Indeed, he made such excellent voyages to *Danzig*, that the house, with which I was formerly connected, kept him constantly going backwards and forwards to that port for wheat, for a considerable period. He was so unfortunate as to lose the "Union," and is now in the "Highlander," and on his voyage out with emigrants to America.

I believe I have now touched on all the topics likely to interest the general reader, but before concluding, I will take the opportunity of redeeming from disgrace a most useful part of the community, I mean "*the speculators in foreign corn*," who are too frequently held up to public odium. In *Sweden*, *Prussia*, *Spain*, *Denmark*, &c. magazines or storehouses of grain are obliged to be erected in different places, in order to guard against bad seasons. In *Spain* alone, there are upwards of 5000 of those depositories (denominated "*positas*"). Every occupier of land is obliged to bring a certain quantity of corn, proportionate to the extent of his farm; the following year he takes back the corn he has thus deposited; and replenishes the empty garner with a larger quantity, and thus he continues annually to increase the stock by these contributions, called "*cresus*," till a certain measure of grain is deposited; then every one receives back the whole corn which he has furnished, and replaces it by an equal quantity of new corn. Whenever a scarcity happens, these repositories are opened, and the corn dealt out to the people at a moderate price.

In some places, seed corn is distributed to necessitous husbandmen, who are bound to restore as much in lieu of it the next harvest. The institution of such a system as this, is no doubt highly necessary in a country only in an imperfect state of civilization; but that which requires the authority of government to accomplish abroad, is in *England* brought about by less

questionable means. The commercial and enterprising genius and spirit of our countrymen, induce them to enter into speculative purchases, and risk the investment of their capital in grain at one period, with a chance of reaping a profit during the deficient season that may succeed, and thus the supplies of a good season and a bad one, are in a great measure equalized to the consumers. In the ruder states of society speculators in corn are the objects of popular hatred, when, in fact, they are amongst the most serviceable members of the community; but for their operations, the people must either incur the chances of famine, or the clumsy machinery of government be resorted to. In offering these remarks, I do it solely from *a sense of justice*, as I myself do not belong to this class of individuals.

ON THE EXCRETORY POWERS OF PLANTS. *By Mr* TOWERS, *Author of the Domestic Gardener's Manual.*

THE paper, at page 320. of this volume of the Journal, entitled "De Candolle's Theory of the Rotation of Crops," refers to one of the most interesting disquisitions that has ever claimed the attention of the agriculturist. It is on a subject that may perhaps stimulate the farmer to reflection and experiment, and tend to abate that prejudice which has but too extensively induced the cultivator to view the reasonings, and even the discoveries, of scientific men, as so many innovations upon the beaten path of routine practice.

Upon these considerations, I hail the appearance of this article, which I have perused and reperused, again and again, with fresh satisfaction. But, while I earnestly recommend the intelligent agriculturist to study it with deep attention, and cordially join in the hope expressed by the Editor, "that the chemists of our own country will prosecute the interesting investigations of M. Macaire;"—while I thus urge the farmer to study, and the man of science to investigate, the theory, it is but justice to myself to vindicate my own claim to originality,—comparatively so at least in respect to the hypotheses brought forward at this time, and said to be established by facts. I disclaim wholly the idea of

detracting from the merits of any author, or of building upon any man's foundation; but when I perceive that a theory is advanced or claimed as recent, which I can prove, beyond a doubt, to have been pointedly and distinctly advocated by me above three years since, I conceive that I am imperatively called upon to make public, by the means at my command, those remarks upon the excretory powers of plants, which I penned in the year 1830.

They who are in possession of the *Domestic Gardener's Manual*, will observe, that when noticing the "*Rotation of Crops*," at paragraph 539, page 430, of that work, I add,—"A rotation of crops is considered by most to be of absolute necessity; and chiefly on the supposition that each plant draws a somewhat different nourishment." I am prepared to admit that each individual vegetable *elaborates its own specific nutriment;* that is, it induces decompositions, which afford it a supply congenial to its own peculiar habit and constitution. *I* also advocate a rotation or change of crops, not, however, on account of the necessity of recruiting an *exhausted soil*, but for the reasons adduced at paragraph 499, under the article "*Raspberry.*"

Referring to that paragraph, page 397, we find,—

"Experience proves, that to have a constant supply of fine fruit year after year, the ground must be frequently changed. Thus, after the raspberries have borne fruit four or five years, one or two roots should be taken up, the strongest suckers selected, and immediately planted in fresh ground. Whenever raspberry plants are removed to another situation, the old ground ought to be well manured, deeply digged, and turned; and then it should be placed under some vegetable crop. By this mode of treatment it will be brought into a condition to support raspberries again in two or three years. *This is a curious and interesting fact*, one which proves that it *is not solely by exhausting the soil* that certain plants deteriorate, if planted in the same ground, year after year; for, were this the case, *manure would renovate the ground;* but it fails to do so, and thus, if peas or wheat, for example, be grown repeatedly on a piece of land, the farmer may manure to whatever extent he chooses, his *crops will dwindle* and become poorer and poorer. This is remarkably

the case in the Isle of Thanet, where, to use a local term, if the land be "*overpea'd*," it becomes as it were poisoned; and if peas be again planted, though they rise from the soil, they soon turn yellow, are "*foxed*," and produce nothing of a crop.

"To account for this specific *poisoning of the soil*, we must suppose that *particular plants convey into the soil, through the channels of their reducent vessels, certain specific fluids*, which in process of time *saturate* it, and thus render it incapable of furnishing those plants any longer with wholesome aliment. In fact, *the soil becomes replete with feculent or excrementitious matter*; and on such the *individual plant* which has yielded it *cannot feed*: But it is *not exhausted*; so far from that, it is, to all intents and purposes, *matured* for a crop of a different nature; and thus, by the theory of interchange between the fluids of the plant and those of the soil, we are enabled philosophically to account for the benefit which is derived from a change of crops."

It was thus that I expressed my opinion in 1830, and by the above quotations of two passages from the Gardener's Manual, I think that I have incontestably established my claim to priority. It is stated in the article on M. De Candolle's Theory, (page 324,) that "Brugmans had supposed a portion of the juices which are absorbed by the roots of plants are, after the salutiferous portions have been extracted by the vessels of the plant, again thrown out by exudation from the roots, and deposited in the soil." This may be the fact, nor am I disposed to deny that two men may entertain the same ideas upon any subject, without any intercourse with, or assistance from, each other. Still I assert, that the theory I adduced was, at the time, purely my own; for, I cannot trace in any accredited author, the least hint of the facts alluded to *. Indeed, in a letter received in

* The opinion of Professor Lindley, published in 1832, in his "Outlines of the First Principles of Horticulture," is at page 19, in paragraphs 52, 53, 54, [illegible], thus expressed:—

"Spongioles secrete excrementitious matter, which is unsuitable to the same species afterwards as food: for poisonous substances are as fatal to the species that secrete them, as to any other species."

"But to other species the excrementitious matter is either not unsuitable, or even deleterious."

"Hence, soil may be rendered impure, (or, as we inaccurately say, worn out) by one species, which will not be impure for others.

"This is the key of the theory of rotation of crops."

May last from the venerable President of the Horticultural Society of London, that gentleman evinces his opinion of the absolute novelty of the theory; thus, "The continental naturalists have *lately* imagined that trees emit some matter into the soil, of the nature of excrement, which subsequently proves noxious; but I do not assent to this opinion."

What Brugmans states is in accordance with my theory, and with that now advocated by M. De Candolle; in fact, I do not see how and in what way we can by any possibility support, in *all its* bearings, the theory of the rotation of crops, otherwise than by that of the excretory power of the roots of plants, and the consequent effects produced upon the soil.

I shall now shortly explain what I mean by "*the interchange between the fluids of the plant and those of the soil*;" and then proceed to notice particularly some of the leading facts stated in the review of the new theory.

I have throughout my work maintained that the vital powers of every living vegetable are stimulated by the *electrising principle of light*; by the agency of which, the nutritive substances being about the radicals, are decomposed, and then attracted and propelled into the recipient vessels of the roots. The element so prepared, I consider and designate the "*fluids of the soil*," which, by the same exciting energy, are, I conceive, carried upwards through the cellular system, till at length they are deposited in the leaves, wherein they are elaborated, and become the vital, nutritive, *proper* juices of the plant. These juices are then, I argue, carried back from the leaves, and distributed in due specific proportions, into cells or vessels appropriated to every required function of the plant; but certain portions are carried to and through the roots, and propelled into the soil; not, however, in the simple bland state of those taken up by the vessels of supply, but imbued with peculiar compound, odorous, and sapid qualities, the effects of the process of elaboration within the vessels of the leaves of the bark. These *exuded juices* I style the "*fluids of the plant*;" and as the processes of supply and ascent, and those of return and exusion, are unintermitting and coincident,—the results of the same mighty electi ng inciple,—I view and describe them as acting *interch* , as by the law of electric *induction*, whatever is excited

tively induces a *negative* condition in a body immediately within the range of its energy. It is evident that the vital principle stimulates the decomposition of the previously inert matters of the soil about the roots of plants, and that to a considerable distance, otherwise no food could be introduced into the inconceivably fine vessels of the fibrils. This food is pale, void of taste or odour; whereas the prepared sap, which distributes the nutritious matter to every part of the vegetable, is frequently possessed of colour, flavour, and scent, and these to a high degree in many species; and the portion that is carried down to the roots, is found to emit a peculiar and very perceptible odour.

In the present state of electrical science, it will scarcely be denied that a subtile fluid pervades all matter; that it is present in, and perhaps the exciting agent of, all chemical action; and, moreover, that it is the source of all the magnetic phenomena. Will it then be deemed a mere play of the fancy, to suppose that the whole of the processes of the ascent of the raw sap, the elaboration of that sap, its distribution, the exusion of a certain portion of it, are specific electrical phenomena, produced almost instantaneously, and inducing one another? I confess that I see no possibility of otherwise accounting for the agency and effects of vegetable vital action, unless, indeed, we consider the vital principle of plants as resembling that of the animal creation, and consequently as including a sentient and discerning faculty, a power of volition and of choice!

Without dwelling upon an inquiry into the precise nature of vegetable vitality, I shall take it for granted that the vital principle is stimulated by external agency, and that all the functions of the plant are at least *excited* by solar light and atmospheric energy, whereby attractions are produced, and decompositions effected, with regularity and precision, and in an order that is exactly suitable to the constitution of each individual vegetable. With this principle before me, I shall now revert to the hypothesis of M. De Candolle, in connection with, and supported as it is by, the experiments of M. Macaire.

The former philosopher conceives that the true theory of the rotation of crops may be found in the fact, that plants exude more or less of excrementitious matters from their roots; and

M. Macaire has followed up the idea by a variety of chemical experiments, whereby he appears to have ascertained that certain plants—one of which was *Mercurialis annua*—took up, by the absorbent powers of their roots, portions of acetate of lead or of lime, which they again yielded to the distilled water, in which the roots were subsequently immersed; and that the fact was proved by chemical reagents or tests best calculated to detect the smallest portions of each of these substances.

"The roots being partly placed in lime-water and partly in pure water, the plants lived well, and the pure water soon shewed the presence of lime by the oxalate of ammonia." Oxalate of ammonia is readily prepared by dissolving a portion—say one drachm—of carbonate of ammonia in as much warm rain or distilled water as will take it up in solution. Into this a quantity of pure oxalic acid dissolved in water is to be dropped, till effervescence ceases, when it may be concluded that a neutral salt is formed. This salt can be produced in crystals; but as this is not required for the experiment in question, I shall not dwell upon it. The saline neutral liquor being simply filtrated through blotting-paper will amply suffice as a test; and, indeed, it is one of the most subtile tests for the presence of lime in solution that we possess; perhaps one-hundredth part of a grain of lime in a gallon or more of pure water would be detected by it.

With this reagent (and it is one of those which every analyst of the soil should possess himself of), the pure water, wherein a portion of the roots grew, was tested, by letting fall a drop or two of the liquid oxalate of ammonia into it; when a milkiness, arising from the union of the oxalic acid of the test with the lime exuded from half of the roots into the pure water, was produced. Such, we may conclude, was the nature and result of one of M. Macaire's experiments, and certainly it is very conclusive. *Oxalate of lime* is an almost insoluble compound; it therefore is manifested in the form of a white powder; the *ammonia* of the test is liberated, and distributed through the bulk of the water.

These chemical experiments are delightful in themselves, and possess very great interest; but, in the present case, an inquiry of greater moment presents itself. Whence came the lime, admitting the fact to be as stated? Nine-tenths of the water of

wells, and even of many rivers, contain lime in one form or another, and to a certain extent. But the recital states that one portion of the roots was placed in lime-water, and another portion of the roots of the *same* plant in *pure* water. By this latter term, a chemist understands *distilled*, or perfectly *pure* and filtrated *rain*-water, collected in glass or glazed vessels, as it falls from the clouds. In such water lime will scarcely be traceable; and, therefore, whatever portion was detected in the pure water, must have passed through the media of the vegetable vessels. "Similar results were made with a weak solution of marine salt" (common table salt), "and with a like result."

The test employed is not stated in the paper, but I conclude it to have been the *nitrate of silver*, because that chemical preparation is one of the most delicate tests for muriatic acid, in consequence of the strong affinity—or rather electro-chemical attraction—which is exerted between that acid and silver whenever the latter is held in a state of solution.

Many other experiments are referred to, and all have tended to prove the correctness of the opinion, that a *rotation of crops is required, in consequence of the excretions from the roots of plants.*

Having thus adverted to a few of the experiments mentioned in the article, I shall now state the facts which led me to the opinion that I formed above four years since, and in which I have been confirmed by repeated subsequent observations. It was notorious that many crops could not be made to succeed, if repeatedly placed in the same individual portions of ground. Manures were found ineffectual; and, therefore, the deterioration of the crops could not proceed from a want of sufficient aliment. The necessity of a rotation was observable chiefly in the farm; still, however, the garden afforded many instances confirmatory of the fact. As I was writing solely upon the produce of the garden, it occurred to me, when treating upon the singular and sudden deterioration of the raspberry, that to the same causes which produced the destruction of a fruit-bearing shrub, might be ascribed the debility that ever followed the successive repetition of a corn crop upon the farm. I had observed that the soil about the roots of the raspberries acquired a peculiar colour and texture: it differed from that of any other soil of the gar-

den: manure was freely applied, and still the plants became weaker, shorter in growth, and less fruitful. I did not know the age of my plants, because the bed had been formed before I came into possession of the ground; but I really ascertained that plants of the white Antwerp variety, which I purchased and placed alongside of an outermost row of the bed, would not take to the soil; and about the period that the whole bed became almost worthless, I saw several remarkably fine plots of the shrub, and conversed with the owners, from whom I learned a variety of facts, which, though detailed in the plain, unphilosophical, manner of cottage gardeners, led me to conclude that the raspberry plant deposited feculent matter in the soil, which, after a certain period, rendered the soil utterly unfit to support the shrub and enable it to produce fine fruit. Reflection and recollection, at the same time, informed me that a variety of vegetable crops imparted a manifest odour to the soil; so much so, that in digging up a crop, the whole plot was perceived to be imbedded with a specific aroma. I confirmed these facts, and then wrote the passages that I have quoted in the early part of this article. Subsequent observations and much experience have confirmed the opinion that I then noted down; so that the reader may rely upon the correctness of the following facts. When peas are sown in pots or boxes, with a view to future transplantation into rows or plots, the vessels become replete with matted roots. Upon removing the peas to their place in the garden, the soil they grow in is found to be completely saturated with odorous matter; it emits a powerful peculiar smell, that cannot be mistaken. The kidney-bean *(Phaseolus)* produces a similar effect, but the odour differs from that of the pea: the same may be observed in plants of the leguminous tribe in general; and I have little doubt that this tribe will be found particularly to require a frequent change of situation. I have already referred to a well-known effect produced by the pea upon the shallow, loamy soil, of that eastern point of Kent, called the Isle of Thanet; and the experiment of M. Macaire with the bean *(Vicia Faba)* is in accordance with, or at least may be adduced in support of, the facts named above.

The Brassica tribe, cabbage, broccoli, &c. also impregnate the soil with a marked and peculiar odour.

From whence do the gases which produce these effects proceed? Many, perhaps, will be inclined to suppose that it is not the soil which gives forth the smell, but the root itself; but how can any plant retain within its substance an odour that is externally sensible? If a flower, a rose for instance, be held at some distance from the nose, the specific aroma of that delightful flower becomes manifest; but could this be the case if the rose did not emit the gaseous vapour which disseminates the odour? Whatever it be that yields odour or scent, whether that be agreeable or offensive, must be material, because it produces a positive effect upon one of the senses; and, moreover, the odour of flowers is very frequently productive of faintness and debility! If the roots of a plant radiate odour, the earth about them, being the medium in which they germinate, must receive the odorific matter; and, in fact, a spade can scarcely be put into a plot of soil that has borne a crop of some vegetables, without liberating, as before stated, a volume of vapour sufficient to be discerned, at the distance of a foot or more, above the surface.

Again, if soil be perfectly fresh, that is to say, raised from the depth of two or three feet below the surface, it will generally be found of a different colour from the old worked soil of the garden or field. A hazel-loam, which is a combination of sand, aluminous and chalky impalpable matter, coloured by oxide of iron, is frequently found at the depth mentioned, and may be considered pure virgin earth. If such soil be planted with strawberries, or almost any vegetable crop, its colour will undergo a change, and become many shades darker. Is this change of tint effected by carbonaceous matter excreted from the roots, by the decomposition of carbonic acid derived from the air, or by the partial de-oxidation of the ferruginous constituent of the earth? The latter may probably operate to a certain extent, but I hold it more philosophical to conclude that the change in colour is to be ascribed to hydrogen gas (holding, perhaps, carbon and other matters in solution), emitted from the roots into the soil, and therein effecting chemical decompositions by specific elective, or rather electric attractions.

This blackening of the soil may be suspected by some to proceed from the decomposition of carbonaceous matters; and it is

highly probable that it does so proceed; but even admitting that manures have been placed in the soil, their decomposition and absorption, according to the received opinion, by the roots of the crop, ought to abstract the carbon from the soil, and not to deposite it therein! But I am supposing a case wherein pure virgin sandy loam, without manure, is employed; and, to simplify the experiment, I say—let a middle-sized garden-pot be filled with such soil, and in it let a single vigorous strawberry-plant be placed in the month of February, and be regularly watered; by the end of August following, that is, about the period when the growing season is almost passed, the soil will be found of a deeper colour, by many shades, than it exhibited when placed in the pot.

My experience has taught me this fact, and I ascribe the effect to the matter emitted by the roots into the earth. Earth so coloured is not, I conceive, exhausted: it is doubtless changed, and in time would be incapable of supporting the vegetation of the plant which had deposited the colouring matter within it, but in respect of mere abstract quality, it is unquestionably richer than it primarily was, having received more than it gave out, and is, in fact, manure for another species of vegetable.

This is in accordance with the very valuable experiment of M. Macaire, which indicates that yellow colouring matter was afforded by the bean to pure water; which yellow matter was *taken* up by "plants of wheat," that "lived well," and afforded evidence of having "absorbed a portion of the matter discharged by the first" (the beans).

My own reflection, and the observation of facts, have satisfied me that certain plants do emit hydro-carbonous compounds into the soil, that poison it, inasmuch as refers to themselves individually; but such experiments, as those of M. Macaire, are invaluable, and ought to be persisted in, in conjunction with daily observations of the soil of the field and garden, till the fact in all its bearings be established. I for one intend, if life be spared to the next spring, to follow the advice given at page 327 of this volume, and to "prosecute those interesting investigations" as far as the means within my command will permit, for they can scarcely fail to lead to important results.

It remains to be observed, that the doctrine of the excretory

powers of plants does not strictly apply to all vegetables; at least, it is manifest that *trees* and many *shrubs* will live on, and improve in, the same piece of ground for an almost indefinite period.

Many garden vegetables furnish also exceptions to the rule, and I particularly notice the potato. In fact, the experiment of M. Macaire seems to afford evidence that this vegetable does not secrete matter of any decisive character. I know those who have assured me, that potatoes have been set for ten or even twenty years on the same land, with little or no other manure than coal-ashes and the scrapings of road-sand. This sand was, in the county I allude to, obtained from the calcareous stone of the neighbourhood, and it proved a powerful meliorating substance to the cold clayey soil of the district.

I venture to suggest, that grain and other crops, which expend all their vegetative energy upon the production of seed-vessels, are less likely to protrude matter from their roots than other crops which abound with large bulky foliage; they, therefore, cannot prove manure crops for their congeners, although they may render the soil unhealthy to themselves individually. With respect to the potato, I think it evident, that its foliage elaborates much vegetative matter, a large portion of which is expended in the production and support of tubers under ground. These tubers are not the roots proper, but enlarged processes, the depositaries of much nutritive matter. It is highly probable, that the plants which produce bulbs, tubers, or spindle roots, whose foliage is abundant or very large, will in general be innoxious to themselves, at least comparatively so, in consequence of the absorbent powers of their bulky root processes. They will in proportion also, be of little service to corn or other crops, unless much manure be previously applied. In a word, the vast foliage which they develope, must claim a great supply of raw sap from the soil. This, or the prepared portion of it, is returned with interest to the roots, but it is then diverted into peculiar channels, and is employed in the production of those processes that constitute so large a portion of the food of man and of cattle. The bulb or tuber-bearing plants are generally but indifferent preparers of the soil for other crops, for they must exhaust its decomposable materials; but they may be grown (though not to full perfection perhaps) on the same

ground without becoming diseased. Such, I think, will be found to be generally the fact; and this, as far as the experiment goes, has been confirmed by the observation of M. Macaire.

From all that has been said, it is, I think, fair to conclude that, although plants decompose and take up the nutritive matters of the soil, and render manuring indispensable, yet it is not by exhaustion that a soil is rendered unfit for a repetition of an individual crop. Facts in abundance might be multiplied, in order to prove that a rotation is called for, in consequence of the feculent matter previously deposited affecting the nutritive power of the soil in supporting any individual crop.

ON THE LAW OF LANDLORD AND TENANT.

A Treatise on the Law of Landlord and Tenant, with an Appendix containing Forms of Leases. By ROBERT HUNTER, Esq. Advocate. 1 vol. 8vo. Bell and Bradfute, Edinburgh. 1833.

IT is not of course our intention to give in an agricultural journal a regular legal critique on a law book, but we are glad to be able to announce to our readers, the publication of a work on a branch of law so important to the agricultural interests, by a gentleman who has done full justice to the subject, and whose learning, research, and judicious arrangement merit the highest praise; and we shall now avail ourselves of it, to condense from the result of his labours, a short account of the Law of Landlord and Tenant in Scotland, as it has been matured from its originally barbarous state, to its present condition, and to present some observations on the valuable forms of leases which Mr Hunter has appended to his treatise.

The earliest state of cultivation by tenants in all countries, seems to have been that generally called the *metayer* system, till within this century practised in Scotland, under the name of *steelbow*, and still prevalent in the East, as exemplified in a great proportion of our territories in India. Under this system the stock, the seed, the implements, were the property of the landlord, who shared the produce with the tenant in proportio

varying according to circumstances. In addition to this state of matters naturally arising among the members of the same tribe, there was introduced another condition wherever one tribe had conquered another, or successive waves of the same tribe had overrun a country, each overwhelming its predecessor. In such circumstances a state of villainage, or often of absolute personal slavery, took place, the conquered race being reduced to the condition of slaves, sometimes complete, at others that of *adscripti glebæ*, and occasionally both conditions existing together in the same country. In England and Scotland it would appear, that, as far back as we have any distinct records, there existed, during the same period, the class of free tenants under the metayer system, that of villains *adscripti glebæ*, and that of personal slaves who might be disposed of, or removed from one estate to another. These two latter classes gradually disappeared with the progress of civilization, and the country came to be cultivated exclusively by free tenants, bound no doubt in many personal services, as the return for their possession, but not subject to the fetters of servitude. Their condition, however, was very unfavourable to the progress of agriculture. Besides the personal services, which of course greatly interfered with their management of their own farms, they were subjected to the still greater disadvantages of uncertainty of possession, and insecurity as to the enjoyment of the produce of their land. Though holding a lease for a term of years, which was binding on the granter and his heirs, they were liable to be ejected by a purchaser, or by the creditors of the landlord attaching his estate, and the fruits reared by them, although in value greatly beyond the rents which they were owing, might be seized in payment of the landlord's debts. The first of these evils was remedied in Scotland, by the celebrated statute of James II. 1449, c. 18. Its terms afford a proof of the miserable condition of the tenantry whom it describes as the "puir people that labouris the grund," and it enacts, that, for their "saferie and favour," "they and all utheris that hes taken, or sall take landes in time to cum fra lordes, and hes termes and zieres thereof, that suppose the lordes sell or annalzie that lande or landes, the takers sall remain with thair tackes into the ischew of thair termes outhais landes that ever thay landes cum to, for siklike

maill (rent) as they took them for.' The effect of this statute was to enable tenants holding tacks for a term of years to continue in possession of their farms till the issue of their lease, and at the rent stipulated therein, against purchasers, creditors, and all others into whose hands the lands might come, except the landlord's overlord entering to possession by default of the landlord;—an exception which subsists to this day, and which, though practically of little importance, as an overlord's entry scarcely ever occurs, is in principle unjust and inconsistent with the spirit of our present enlightened system of legislation. To entitle a tenant to the benefit of this statute, he must have a *written* lease, with a *definite* term of endurance (though there is no restriction as to the *length*, provided it be definite), and specifying a certain rent which must not be altogether elusory, and he must have entered to possession of the farm under this lease; but holding such a lease, every tenant, since this admirable enactment, can with confidence expend his capital in the improvement of his farm, in the perfect certainty that he will continue in possession till the expiry of the period stipulated in the tack. The absolute necessity of such a provision is obvious, and it formed in Scotland the first step in the improvement of agriculture.

The other evil mentioned above, of the liability of the tenant's crops to be distrained for his landlord's debts, was remedied by a statute passed twenty years after the act 1449, and in the reign of James III. (1469, c. 36), having for its title, "That the puir tennentes sall pay na furthur than their terme's maill for their lordis debt, be the breife of distresse." It enacts that to "eschew the great herschip and destruction of the kingis commons, maillers, and inhabitants of lordis landes thrugh the force of the breife of distress,"—"fra hynefurth the puir tennents sall not be distreinzied for the lords debtes, furthur than his termes mailles extendis to," and that "gif the creditor takes the termes maill be virtue of the breife of distresse, it sall not be leifful (lawful) to the lord to tak it againe."

By these two statutes the condition of the tenant, so far as regards his legal rights, was placed on nearly the footing on which it stands at present. He was still, however, subject to personal prestations to his landlord; and he possessed his farm under the steel-

bow system necessary in rude times when the tenantry could have no capital; but this state of matters being dependent on private stipulation, and incident to the condition of society, it gradually disappeared, the whole return for the possession of the land coming to be comprised in rent, and the steelbow system having been universally abandoned, except in regard to manure and its materials, as to which it still very generally prevails; dung and straw being left without charge to the tenant at his entry, under the obligation of leaving an equal quantity to his successor. To this extent, indeed, the steelbow system seems exceedingly advantageous, as by no other could the new tenant obtain, so conveniently, a proper supply of manure for his first crop, while the outgoing tenant, who had in like manner received his dung at his entering, gratuitously, is subjected to no inconvenience; and its general prevalence to this day is of itself sufficient proof of its beneficial tendency, though unfortunately, this beneficial system has been departed from in many parts of the country north of the Tay.

The tenant, though secured in his own possession, against all parties into whose hands the lands may come, has not however himself the absolute disposal of his lease, so as to transfer his right of possession to whomsoever he may please. The landlord, in accepting him as tenant, is held to have exercised a *delectus personæ* —a choice of the individual as calculated to make a beneficial tenant, and is not liable to have others than the tenant so chosen, or his heirs-at-law, forced upon him without his consent. Mr Hunter seems to think that the origin of this privilege on the part of the landlord was not for the purpose of securing for his tenant the best cultivator, but to prevent the farm from falling into the possession of some person of power and influence, who, in the days when might and right did not always go together, might have appropriated the land, or at least retained possession after the expiry of the term of endurance, and without the possibility of obtaining payment of the rent; and he quotes several instances from ancient tacks, which he has with very praiseworthy investigation searched out from the chartularies of our religious houses, whereby the tenants are barred from subletting to any persons of greater importance, or to any, ex-[illegible] "sik like persons as hymsel," or "of na greater dygre nor

yameselfs." Whatever be the origin of this rule, it is a very beneficial one in its practical operation, limited as it is in our law. It only extends to *agricultural* subjects, and even as to these it has no place, except in leases of *ordinary* endurance, the power of assigning and subletting being held to be implied in leases of *extraordinary* duration, though what period shall be considered ordinary, or what extraordinary, is somewhat doubtful; this however being fixed, that a lease for nineteen or twenty-one years is a lease of *ordinary*, and one for fifty-seven years of *extraordinary*, endurance. It may also be always excluded by direct covenant, and it does not affect the tenant's creditors, who are entitled to attach his lease, unless there be an express clause excluding them. When the tenant has power to assign or sublet, whether by express permission in the lease, or by implication from its period of endurance, if he *assign*, he becomes free from all obligations in future, while the assignee comes into his place as to these, and also becomes liable to the landlord for any arrears of rent remaining due; while if he *sublet*, he continues still liable to the landlord for the rent, and the subtenant having paid the subrent to the principal tenant, (the term of payment having elapsed), cannot be subjected in payment to the landlord, although the principal tenant have failed to pay the rent to him. In order, however, to render an assignation or sublet effectual and complete, it must be followed by possession, natural or civil, on the part of the assignee or subtenant. Where natural possession follows, there can be no difficulty, but in regard to what shall constitute a civil possession, *i. e.* a possession by others in his right, sufficient to render the assignation or sublet effectual, a great deal of difficulty exists with reference to the case in which such rights are most commonly granted, viz. that of an assignation to a sublet of a valuable lease in security of a loan of money. To obviate these difficulties, and at the same time secure against the evils which would arise from the existence of latent rights in parties not openly in possession, it has been proposed to establish a record for leases similar to that for heritable rights, which would render leasehold property equally available for raising money on security, with perfect safety to the public, and without any change in the occupation of the property. Mr Hunter has inserted in his Treatise a plan to

this effect, proposed by Professor Bell; and as it is a matter of public interest, we shall here present it to our readers, expressing our earnest hope that it may ere long be adopted by the Legislature.

"1*st*, Where lessees or sublessees of heritable subjects are entitled to assign or sublet, it shall be competent to them, although still retaining the actual possession of the subjects let, effectually to grant assignations or subleases, as securities of debt, money borrowed, or cash-credits.

"2*dly*, The assignation or sublease shall be duly intimated to the landlord of whom the granter holds; or, if the granter be a sublessee, to the lessee of whom he holds, or his heirs or assignees.

"3*dly*, The assignation or sublease, together with the instrument of intimation, shall be recorded in a register, to be kept by, and always to remain in the hands of, the keeper of the Register of Sasines in the county or burgh within which the subjects lie. But this record shall be separate and distinct from the Register of Sasines; and it shall be at all times patent to all concerned, on payment of a small fee.

"4*thly*, The assignation or sublease shall be held in competition to be complete as a security only from the date of recording; and the right of hypothec, and all other rights, shall be fully reserved."

The tenant, having entered to possession, is entitled to enforce, on the part of the landlord, implement of his obligations under the lease, by action or by diligence under the clause of registration, or by retention of rent in regard to all direct obligations, property forming the counterpart of that on the part of the tenant to pay rent. The decisions of the Court as to the power of retaining the rent, have not been so consistent as is to be desired; but, on the whole, the general rule above mentioned may be fairly deduced from them; while, on the other hand, the tenant is not entitled to retain the rent for any alleged claim of *damage* consequent on non-implement of the landlord's part solely to enforce implement of the obligation itself.

The landlord, on his part, has various and very effectual means of enforcing fulfilment of the tenant's obligations, of which the principal is the payment of rent.

1*st*, He has his remedy by action or by diligence on the registered lease.

2*dly*, He has the power of bringing an action of removing against such tenant as shall have fallen two years in arrears of rent; in which, if the tenant do not pay up the full amount of arrears, and also find security for payment of the rent for the next five years, he will obtain decree putting an end to the lease, and ejecting the tenant; and,

3*dly*, He has a hypothec for the rent over the crop and stocking on the farm.

The hypothec over the crop is only for the rent of the year in which it is raised; while that over the cattle applies to them for the rent of the current year, and subsists for three months after the year has expired. In virtue of this hypothec, the landlord has a preferable right to the crop and stocking for payment of his rent, to the exclusion of the creditors of the tenant, excepting as to debts due to the Crown, feu-duties owing to the superior, wages due to farm-servants, or persons hired to reap the crop, whose claim is preferable to that for rent, and the funeral expenses of a tenant deceased. The right of hypothec, too, not only subsists while the grain, &c. remains on the farm, but is available against intromitters who may have removed it, although they be *bona fide* purchasers who have paid the price to the tenant. If the removal be discovered *de recenti*, the landlord may recover the property *via facti*; otherwise he must take judicial measures; and he can only recover from the immediate purchaser, or intromitter, and not from any third party to whom it may have been sold. An exception to the landlord's right of recovery has, for the advantage of commerce, been admitted in cases of sale *by bulk* in public markets; the purchaser in such case being secure, although the tenant's rent may be unpaid. This exception was recently attempted to be extended to sales *by sample*; but it was decided, both in the Court of Session and the House of Lords, that the protection belonged exclusively to sales by bulk, in which case, the removal of the subject itself from the farm gave the landlord warning to interfere, and put his right of hypothec in force.

This decision gave rise to the introduction into Parliament of three several bills for altering the law, and affording protection

to sales by sample after the lapse of a short period, giving at the same time such publication of the sale as to enable the landlord to secure himself within the period specified, after which his right was to be entirely excluded. The plan of publication of the sales, however, which was absolutely necessary for the security of the landlord, seemed to be still more disliked by the parties for whose benefit it was intended, than the exercise of the right of hypothec as it stood, and the bills were all successively abandoned; and, indeed, although beforehand considerable injury might be expected to result from the present system, it, in point of fact, very rarely happens that any loss is sustained by the exercise of the landlord's right. The right of hypothec is made effectual to enforce payment of the rent by a very simple process,—that of sequestration and sale under warrant of the Sheriff.

Besides the obligation to pay rent, the tenant is also bound, at common law, and without any express obligation, to labour his farm in a husbandlike manner. This, however, is generally provided for by special covenants, to which we shall advert when considering the forms of leases, and, in the mean time, we shall only generally observe, that, when an additional rent is stipulated for, in the event of deviation from the prescribed mode of cropping or management, the landlord is entitled to levy the full additional rent, however greatly beyond the damage actually suffered it may be, while the tenant is not allowed, as he is in England, to take his option of deviating and paying the additional rent, the landlord being entitled, if he see cause, to interdict him from deviating, and to compel him to follow the course prescribed in the lease. One obligation as to management is always implied, viz. that the tenant shall expend on the farm the manure made upon it, and that he shall leave to his successor the dung and fodder remaining unexpended at the term of removal, he being entitled to the value when it is to be sold elsewhere, and when it has not been stipulated that he shall leave it without value. The rule as to what portion of the dung or fodder the tenant shall receive value for, whether under express or implied obligation to leave it, has varied with the alteration in the mode of cultivation. The general principle is, that he is not entitled to value for any dung which he ought,

before the term of removal, to have expended on the lands; and, as it was formerly the practice to expend the dung made during winter on the ground devoted to raising bear, the rule adopted by the Court was, that the tenant should only have the value of such dung as had been made after bear-seed time, it being held that all the dung previously made should then have been expended on the farm. The great change which has taken place in this respect in the system of husbandry, the dung being, in good districts, almost entirely reserved for laying on with green crop, or on fallow, during the ensuing summer, induced the Judges to adapt the rule to the altered system of the country; and they accordingly, in a late case, which was one of express covenant in regard to a farm in the Carse of Gowrie, most properly found the tenant entitled to value for the whole dung since the preceding wheat-seed-time, and for the straw, in so far as not exceeding the quantity necessary for the purposes of the farm, until the new crop should be reaped, Lord Cringletie, Ordinary, judiciously observing,—"Law is a science which must vary with the manners and customs of society, and improvements in every department, and, consequently, it appears to the Lord Ordinary impossible that any judgment of this Court applicable to a mode of agriculture forty years ago, can regulate it now, when the system is greatly improved; nor that a judgment applicable to one sort of land can govern the management of a soil totally different."

At the expiry of the term of endurance stipulated in the lease, the landlord, if he wish to remove the tenant, must give him warning, or raise a summons of removing, forty days before the Whitsunday which is the term of removal, or which immediately precedes the term of removal, where that is other than Whitsunday; and, in like manner, the tenant, if he mean to quit, must give notice of his intention, otherwise the parties continue bound to each other for another year by tacit relocation, which will continue to take place, year after year, until warning or notice be given.

Having thus presented a general sketch of the law as between landlord and tenant, we shall now submit some observations on the contract which constitutes the relation between them. To

be effectual for a longer period than one year, even in a question with the parties themselves, the contract must be in writing, a verbal agreement for a term of years, though admitted by the party entering into it, being binding only to the extent of one year. It is not necessary, however, that the writing be strictly formal, and executed with all the solemnities of probative writs, provided possession have followed upon it, in which case it will be operative against the parties, although defective in the usual solemnities, and even though not subscribed by one of them. The form and substance of our present lease, Mr Hunter shews to have been transmitted from the Romans, with some not very material variations, through the churchmen who were long our only conveyancers, and retained the forms their predecessors had been in use to employ during the subsistence of the empire, and who also led the way in the improvement of the condition of the cultivators from that of villains *adscripti glebæ*, to that of free tenants.

The relation between landlord and tenant, in regard to the covenants of the lease, which may be said to place the parties on an intimate footing, is of so extensive a nature, that the law on it must necessarily occupy a large portion of a work devoted to the subject. Mr Hunter's Treatise is accordingly much occupied with the subject. It explains the law with great care and much perspicuity. Its importance requires ample illustration. It is, however, unnecessary for us to enter minutely into the subject on the present occasion, as the particular clauses of the "written agricultural lease" have already received a thorough explanation in two articles which have appeared in this Journal, viz. at page 809 of the first, and at page 126 of the second volume; and to which two articles Mr Hunter makes honourable reference as an authority.

We will take this opportunity, however, of remarking on *the necessity of mentioning explicitly in the written lease the course of cropping which is to be followed on the farm during the tack.* Time was when clauses of minute management were not necessary, when much was left to the discretion of both landlord and tenant, and when both were imbued with the spirit only of

improving the land. We are sorry to observe that advantage is now taken by landlord as well as tenant, when every minutia of good husbandry is not specifically mentioned in writing. This altered feeling betwixt landlord and tenant arises, we fear, from the straitened circumstances of both parties. Neither can now afford to be so generous to each other as he wont to be. The more the pity, for the land is always sure to be depreciated in its fertility by a conflict between the parties. To illustrate what we mean, we will mention two recent instances in which advantage was taken under a written lease. A tenant who left his farm at the term of Martinmas, was obliged to have some turnips as well as bare fallow on his fallow division, and he was to be paid either by the landlord or the incoming tenant for the labour he might have expended on the working of the fallow land during the summer. Knowing he would himself have no use for turnips on the farm which he was about to leave, he only made a small patch of them, just that it could be said there were turnips on the fallow division, his great object being to be paid for the labour of his horses during the summer in the working of the fallow land, of which he made an inordinate quantity that season, for the farm was best adapted to the turnip husbandry. The landlord resisted the payment of the labour of so much bare fallow, and matters were at length settled between them by arbitration; but the incoming tenant nevertheless suffered severely for want of turnips to his stock during the following winter. This is one of the evils, among many others, of a Martinmas entry. The other instance was the case of a landlord who promised in a written lease to pay the expense of cutting all the drains which the tenant thought necessary to make. It was also mentioned in the lease that the tenant was to give intimation to the landlord when he was to commence cutting a new drain. The landlord had gone over the farm with the tenant a short time after the entry, and after some of the drains were in progress, but as he lived a great distance from this part of his property, the tenant did not think it worth his while to trouble him with a written intimation of every trivial drain he might make in every field. Every year when he paid his rent, the tenant handed in the account of the expense of cutting the drains. The landlord never paid the accounts, and the tenant went on

draining for some years, trusting to the honour of his landlord, and not wishing to take the law into his own land by a retention of the rent. At length the landlord refused to pay the accounts after all the drains had been completed, because the tenant had neglected to intimate to him the opening of each drain, according to the written terms of the lease. These accounts cannot of course be settled without the intervention of a law-plea.

Such instances show the necessity of strict covenants in a written lease, and because however strictly parties may apparently be bound down, violations both in the spirit and the letter of the agreement may arise. "Where there is a will, there is a way," is a true proverb. The clauses which relate to the cropping of the land, are generally constructed with the specified number of acres which each division of crops should contain, in regard to the rotation of cropping best suited to the nature of the soil. To mention the specified number of acres in each division or in the whole farm, may lead to serious disputes between landlord and tenant. On the part of the landlord, the tenant may be challenged for not having the exact number of acres of a certain kind of crop, when, perhaps, the laying out of the fields of the farm prevented such exactness on the part of the tenant. The tenant, on the other hand, may discover that the farm does not contain the number of acres that was represented to him, or that the rotation dictated in the lease by a specified number of acres was impracticable. He cannot, therefore, fulfil the exact terms of his agreement. To suffer under such circumstances would be unjust. We remember of a long litigation between a landlord and a tenant, arising from inability on the part of the tenant to fulfil his exact engagement. He discovered that he could never have the specified number of acres of each kind of crop every year. An accurate measurement, undertaken by an eminent land-surveyor, proved to him the farm did not contain the number of acres it was represented. He claimed a reduction of rent and exoneration from the exact terms of the lease. The landlord would allow neither. The Court settled both in favour of the tenant. Much of this kind of mischief arises from the employment of inferior land-surveyors, or ignorant agents who cannot know the particular clauses of a written lease from experience, and much also from the overweening confidence in the

tenant in the man-of-business employed by the landlord, whose manners are peculiarly bland when letting a lease.

To avoid all unfortunate collisions between landlord and tenant, who ought always to be the best friends, every item of agreement ought to be minutely set down, and yet in such general terms as the items may be applicable to the altered circumstances of the times. This sentence may appear paradoxical at first sight, but the advice which it contains may thus be acted on:—Let the rotation of crops which is best suited to the soil be fixed upon by the landlord, and this rotation must on no account be deviated from unless by his consent. To insure its operation throughout the lease and upon any farm, the proportion which each division of the rotation bears to the whole extent of the farm, should be specifically stated, instead of the number of acres for each, because the proportionate scale will apply to every size of farm. Thus, should the rotation of five crops be adopted, then the grass division will occupy one-fifth of new, and one-fifth of two-year old grass; the white crops will occupy two-fifths, and the fallow division one-fifth; and to prevent any subterfuge in the management of the fallow division, it should be specified that turnips shall occupy at least one-half or three-fifths of it, according as the soil is more or less suited to the growth of turnips.

It may seem a hardship to a tenant to be absolutely restricted to a particular mode of managing his farm, when, by his superior abilities, he might be able to raise crops of a superior order. Experience has now so well established the advantages derivable from a judicious rotation of crops, that the most able farmer ought not to be ashamed of being held in its trammels. His ability and ingenuity will be amply displayed, and his profit will be more secure in economising the labour and maintaining the fertility of the land under an established rotation, than in the attempt to improve that rotation. Certain contingencies may certainly arise which will necessitate the farmer to depart from a regular rotation, such as the failure of the turnip crop by the attack of noxious insects, or the loss of a braird of grass by bad seed. If these failures happen from no fault of the farmer, his landlord will never hesitate to permit him to deviate from the stipulated arrangement, on the understanding that he endeavours

to regain the rotation as soon as practicable. Or should a new species of crop be introduced which might benefit the country, such as the turnip when it was introduced into husbandry, no considerate landlord would object to a slight deviation from the fixed rule, to suit the extraordinary altered circumstances of the times. The latter inconvenience can only occur on a farm under a long lease, the former may happen under any species of tenure.

But strict clauses in a lease are less necessary in a district which bears the reputation of good corn farming, than in an inferior district, though even there strictness can do no harm, provided it is made in conformity to good practice. Strict clauses are also less necessary under large proprietors, because in general their lands are never rack-rented, and when rents are moderate there is little temptation to the tenant to take any advantage of his farm. They are least necessary of all in districts which are devoted to the mutual rearing of crop and stock. The necessity of equalising the food of live-stock on farms on which they are bred, render the departure from a regular rotation impossible. On the other hand, where a flying stock is maintained, and where agriculture is little known, strict clauses are absolutely necessary in leases to prevent deterioration in the fertility of land, and to discipline the minds of the tenantry to a system of good husbandry.

ON THE DISEASE IN CATTLE CALLED THE "CROCHLES." *By Mr Joseph Tait, Portsoy, Veterinary Surgeon to the Banffshire Farmer Club.*

Since taking up my residence in this quarter, my attention has been particularly directed to a disease, which is very prevalent in this and the neighbouring parishes, and known among the country people as the "crochles *." It appears to me to be dependent on the state of improvement to which the lands may be brought, and the facility given to the water to run off, as in those lands where there is much uncultivated ground, and where, from a paucity of drains, the water is allowed to remain on the

* This disease is called the "cripples" in Forfarshire, where it is very prevalent. The proper name of the disease is *Acute Rheumatism.*—Edit.

surfaces, and form a marsh, this disease is much more prevalent, and in many cases proves fatal. I am the more inclined to ascribe the disease to this as a primary cause, as in other soils *not* of a retentive bottom, and where drainage has been attended to, the disease has never appeared, or if so, in its very mildest form. The cattle in the upper parts of the parishes of Fordyce, Ordiquhill, and Grange, are particularly subject to this disease in its most malignant form. The nature of these lands is marshy in the highest degree, and intersected by large patches of moss, when the water is allowed to become stagnant, or, if carried off, is in many cases only conveyed from the moss to a plot of cultivated ground, thereby extending rather than checking the tendency to disease among their cattle, by supplying them with very bad grass. I have observed that cows generally become affected with this disease in the spring, or a few months previous to calving. They do not appear to be the only animals subject to its attacks. A few years ago, I saw one of Lord Seafield's red deer, labouring under a very severe attack of it. On examining him, I found a good deal of œdematous swelling to exist about the limbs, the joints much enlarged, the gait of the animal at same time proving that the whole body was similarly affected. It was pitiable to see one of the "finest of the forest" so completely overcome as to be unable to move from the place he was standing in: I advised him to be removed to a change of pasture. This had the desired effect, and in a few months he was in all his pristine glory. I have invariably found this to be the best mode of treating the disease. Indeed, if attended to at first, there is every chance of the animal's complete recovery.

The symptoms of this disease when observed at first, are pains in the feet, particularly in the forefeet, and enlargement of the small joints of the limbs. The animal becomes hidebound, and the hind quarters so weak and contracted as to prevent her from standing, and in almost every case deprives her of the power of progression. In this the most severe kind of "crochles," I have seen the animal lying on a small plot of ground, and fed with a little grass, or a few cabbage leaves, till completely worn out with lying in one posture, without the power of

change, and all over bruised; she has even refused to swallow any thing but meal and water. Death now closes the scene, and presents to the view a most pitiable object, with contracted limbs and almost fleshless bones. I have often thought anxiously of something which might tend to alleviate the sufferings, if not check the progress, of the disease; but I am sorry to say, that no local or general application has as yet produced any good effect. In the first stage of the disease, I have observed bloodletting, and the administering of laxative medicine, to be of some service in arresting its progress; but when the animal was not removed to other pasture, it generally returned with double severity. Empirics abound with their specifics for this as well as almost every other disease, and to whom the ignorance and credulity of the lower orders of our peasantry present a wide field for imposition. A singular case of this fell under my own observation, which I shall relate in the words of my informant. Soon after commencing practice in this district, I was particularly struck with the appearance of a cow belonging to a "cottar." On inquiring into the cause of the animal's apparent helplessness, my informant stated to me, "that she had the crochles, but was now in the way of getting better, a man having pared out the worm that was the cause of the awful complaint." On examining the cow, I found the muscles shrunk, the skin sticking to the bones, joints enlarged, and about three inches sawn from each claw of her feet, and evidently suffering much pain. I endeavoured to impress upon him the impropriety of allowing any ignorant person to impose upon him to such a degree, and mutilate an animal so valuable to him, but was told in reply that he was sure the man "knew the very spot where the worm lodged," and that he appeared to have great experience, having travelled much as a "beggar." For this wonderful operation the very modest charge of 2s. 6d. was only made. I ultimately prevailed on this individual to get her removed to a farm which the disease had never visited. From such a step, the most beneficial change resulted. The animal in the course of a short time began to move about, and would have become perfectly sound, had not the "*beggar*" removed a part of the bones of the feet along with the "*worm*." A removal therefore from the farm where such a disease is prevalent, cannot be

too strongly inculcated upon every farmer, as it appears to be the only mode of treatment which is productive of decided good. On a *post-mortem* examination of several cattle labouring under this disease, I have invariably found the cartilages of the joints either ulcerated or almost completely destroyed, by the continual friction of the bones, in consequence of a diminished secretion of synovia. All the internal organs seemed in healthy condition.

ON WHEEL-CARRIAGES. *By Mr* WILLIAM GALBRAITH, *A. M. Edinburgh.*

To resume the subject of agents employed in moving carriages, which has already been partly discussed, it will be necessary to recur to the principles and formulæ laid down in pages 534 and 535 of Number X. (Vol. II.) of this Journal. It is there stated, and will shortly be shown, that the greatest effect is produced when the animal moves with one-third of the speed with which, at the greatest velocity, it is just able to move itself without carrying any load, and at the same time is loaded with four-ninths of the greatest load it is capable of moving. A man's greatest velocity is about four miles an hour, and the greatest force he can exert, when the body on which he acts is at rest, is, for men in general, nearly 72 lb. Now, one-third of 4 miles is $1\frac{1}{3}$ mile, and $\frac{4}{9}$ of 72 lb. is 32 lb. It therefore follows that a man, according to this mode of estimation, would work to the greatest advantage, when he moved with a load of 32 lb., and walked at the rate of $1\frac{1}{3}$ mile an hour. In this case, formula (a'), page 535, No. X., or $f = \frac{9}{32}(4 - v)^2$, would become

$$f = \tfrac{9}{32}(4 - 1\tfrac{1}{3})^2 = \tfrac{9}{32}\left(\frac{12-4}{3}\right)^2 = \tfrac{9}{32} \times \tfrac{64}{9} = 32 \text{ lb.} \quad \ldots \quad (D);$$

since the letter v, signifying the actual velocity of motion, is in this case $1\frac{1}{3}$ miles an hour.

Desaguliers, one of the more early writers on this subject, states that a horse drawing a weight out of a deep well, by a rope passing over a pulley having little friction, will raise 200 lb. for eight hours together, at the rate of $2\frac{1}{2}$ miles an hour. Sup-

posing the horse in this case to work to the greatest advantage, which is known to be nearly true, there would be obtained for the horse, on the same principles as before, the value of F in formula (A) page 534, equal to 450 lb. $V = 7\frac{1}{2}$ miles an hour, v the known velocity, being $2\frac{1}{2}$ miles an hour.

$$\text{Hence } f = 450\left(\frac{7.5 - 2.5}{7.5}\right) = 8\,(7.5 - v)^2 = 200 \text{ lb.} \quad \ldots\ldots \text{(E)}$$

This result seems to be rather too great, when compared with some late experiments.

In the eighth volume, new series, of the London Philosophical Magazine, page 22, Mr B. Bevan, civil engineer, has given the results of eight series of experiments on the power of horses working in the plough, which, at a mean for 144 horses, gives 163 lb. for the constant force of each horse exerted in drawing the plough. If the third experiment be rejected, as it is so much under all the others, the mean would be 168 lb. for each horse walking at the rate of $2\frac{1}{2}$ miles an hour, whence as before,

$$f = 378\left(\frac{7.5 - v}{7.5}\right) = 6.72\,(7.5 - v)^2 = 168 \text{ lb.} \quad \ldots\ldots \text{(F)}$$

When the work of a horse is estimated by the load which he draws in a cart or waggon, it generally bears some relation to that load, according to the good or bad construction of the cart, and the more or less easy motion of the wheels.

Though accurate experiments on the friction of wheel carriages have never been made with due care on a sufficiently extensive scale, yet no great error can be committed in supposing the friction on the road with a carriage of the ordinary construction, on the usual roads, to be between $\frac{1}{6}$ and $\frac{1}{12}$ of the load. If, then, a horse draw a ton in a cart, which a strong horse will continue to do for several hours together, his action may be supposed the same as if he raised the twelfth part of a ton, or 186 lb. perpendicularly against the force of gravity, as in the case formerly mentioned. To raise a weight of 186 lb., at the rate of $2\frac{1}{2}$ miles an hour, may, from the consideration of the action of a horse in a cart, be taken as nearly the average work of a strong draught horse in good condition. This is somewhat less than the estimate of Desaguliers, and a little more than that of Mr Bevan, and it would give—

$$f = 7.44\,(7.5 - v)^2 = 186 \text{ lb.} \quad \ldots\ldots \text{(G)}$$

The mean of all these co-efficients, 8, 6.72, and 7.44, will be 7.17, or, for simplicity, about 7 in whole numbers nearly, which finally give—

$$f = 7\,(7{\cdot}5 - v)^2 = 175 \text{ lb.} \quad \ldots\ldots\ldots \quad \text{(H)};$$

where v is, as usual, one-third of the greatest velocity ($7\frac{1}{2}$), or $2\frac{1}{2}$ miles an hour for strong draught horses. Indeed $7\frac{1}{2}$ miles an hour will be nearly the greatest velocity of such horses as are generally used in waggons and heavy carts, though, for those breeds of horses which run in mail-coaches, it must be too small, since they generally go at the rate of 10 miles an hour for one stage of 10 or 12 miles twice a-day, when they receive a good rest between them. From this circumstance, it is evident that V, or the greatest velocity, must vary according to the quality of the horse, in relation to the manner in which the animal may be crossed with the finer breeds, while F must likewise change its value somewhat indirectly as V, as it is well known that slow heavy horses at a moderate pace, can exert greater force, while light horses, at a considerable velocity, exert less. It is not too much to estimate V at 15 miles an hour for the latter kind of horses, and F at 180 lb. or 200 lb., about one-half the former, for strong draught horses, and consequently

$$f = 180\left(\frac{15 - v}{15}\right)^2 = \tfrac{4}{5}\,(15 - v)^2 = 80 \text{ lb.} \quad \ldots\ldots\ldots \quad \text{(I)},$$

supposing v to be $\frac{1}{3}$ of V (15) or 5 miles.

By this means, the relative effects at their maximum value will be easily found from formula (C) page 535, No. X. or

$$f \times v = 175 \times 2\tfrac{1}{2} = 437\tfrac{1}{2} \text{ for cart-horses.}$$
$$f \times v = 80 \times 5 = 400 \text{ for coach-horses.}$$

So that the greatest effects by these different kinds of horses, when the most favourable velocity is combined with the best weight, are very nearly equal; and the greater strength of the draught horse is, in a great degree, counterbalanced by the greater velocity of the coach-horse.

To point out clearly the relative effects produced by these two kinds of horses at different velocities, the following table is given. Part I. for cart-horses, and Part II. for coach-horses.

TABLE I.

I. Cart-Horses.			II. Coach-Horses.	
v	f Form. (H.)	E or $f \times v$	f Form. (H.)	E or $f \times v$
Miles.	Pounds.	Effect.	Pounds.	Effect.
0	394	0	180	0
1	296	296	157	157
2	212	424	135	270
2½	175	437	125	312
3	142	426	115	345
4	86	344	97	388
5	44	220	80	400
6	16	96	65	390
7	2	14	51	357
7½	0	0	44	337
8	...	...	39	312
9	...	...	29	261
10	...	...	20	200
11	...	...	13	143
12	...	...	7	84
13	...	...	3	39
14	...	...	1	14
15	...	...	0	0

In this table, the first column contains the velocity of the horse in miles an hour; the second contains the force which a cart-horse is capable of exerting, in pounds avoirdupois, at the different velocities marked in the first column; the third, the effect or product of the velocity multiplied by the force in pounds which the animal can exert at that velocity. The second part, for coach-horses, contains two columns corresponding to those in Part I. for cart-horses.

By inspecting this table, it will be found, by columns first and second, that a cart-horse works most advantageously when moving at a rate of between two and three miles an hour, and exerting a force in pulling of between 150 lb. and 200 lb., since the numbers in the third column are then greatest, and they decrease at both a greater and smaller velocity, and consequently the labour becomes less effectual.

Comparing column first with the two columns in part second, it appears that the most effective rate of a coach-horse is five or six miles an hour, when exerting a force of traction of between

60 lb. and 100 lb.; consequently, there is a loss of effect when coach-horses move either faster or slower than this rate. No doubt the mail-coaches move faster than this rate (almost double indeed), but then the horses can exert little force if they do not injure themselves, or, if they are compelled to exert considerable force, they are worn out in a few years if they run two stages exceeding eight or ten miles a day.

In order to illustrate this subject more fully, it will be necessary to have recourse to investigation.*

Let f be the force exerted by the muscles of the animal, which is continued for a day, b the weight of the animal itself, s the space described in a given time, and v the velocity; then, by the principles of dynamics, v will vary as $\sqrt{\frac{fs}{b}}$. (Hutton's Course of Mathematics, vol. ii. § 133.) Now, the space s will be inversely as the duration of a day's work, denoted by d, or s is as $\frac{1}{d}$, and, consequently, v is as $\sqrt{\frac{fs}{bd}}$. For a horse of average strength, $f = 250$ lb. nearly, and b about 1000 lb., or, in general, the force exerted by the muscles will be about one-fourth of the weight of the animal's body; and as f, s and b are all constant, it follows that

$$v \text{ is as } \frac{1}{\sqrt{d}} \quad . \quad . \quad . \quad . \quad . \quad . \quad (K);$$

or, in words, the velocity varies inversely as the square root of the length of the day estimated in hours of working.

It has already been shewn, that the maximum velocity of a strong cart-horse is about 7.5 miles an hour, and that of ordinary coach-horses about 15 miles an hour, and that they cannot keep up that speed without injury for more than one hour.

On these principles, the following table shows the duration of labour, and greatest velocity of a horse of each kind, in miles per hour, which, by interpolation, may serve for any other velocity required.

* I beg to apologise to those readers not conversant with mathematical reasoning. Indeed, they must rest contented with the particular examples, which are always given for their especial use, while those possessing sufficient science will doubtless be gratified with a development of the principles on which general conclusions are grounded.

TABLE II.

Duration of Labour,	H. 1	H. 2	H. 3	H. 4	H. 5	H. 6	H. 7	H. 8	H. 9	H. 10
Greatest velocity. Cart-Horse,	M. 7.5	M. 5.3	M. 4.3	M. 3.7	M. 3.4	M. 3.0	M. 2.8	M. 2.6	M. 2.5	M. 2.4
Greatest velocity. Coach-Horse,	M. 15.0	M. 10.6	M. 8.6	M. 7.5	M. 6.7	M. 6.1	M. 5.7	M. 5.2	M. 5.0	M. 4.8

This table will represent very nearly the rate of decrease of velocity by an increase of the duration of the time of labour on a level road. But if the road be inclined the velocity of ascent will be diminished in the ratio of the sine of the angle of elevation, or it will be increased in descent in the same ratio; that is, if the road rise or fall one foot in a hundred, the velocity will be diminished or increased by about one-hundredth of that stated in the table. The results in the table are those corresponding to a horse loaded very slightly, so as to continue to do so day after day without being injured, and must therefore be the utmost limits of velocity, though the work done must be little or nothing. It is also obvious, that if the load be so great that the horse can just move it, the work done in this case will also be nothing; but between these limits of velocity and power there must he a ratio at a certain point, which will produce the greatest quantity of useful effect, and must therefore be the most advantageous for the application of horse-power. To obtain this quantity, let V be the maximum velocity when unloaded, v the actual velocity, as in formula (B) page 534, No. X., or $F - F\left(1 - \frac{v}{V}\right)$. Let $V - v = u$, then $F\frac{v}{V^2}(V - v)^2$ $= \frac{F}{V^2}(V^2 - F\frac{u^2}{V^2}(V - u)$ Omitting the constant quantities and making $u^2(V - u)$ a maximum, by putting its fluxion equal to nothing, that is, $2Vu\,du - 3u^2\,du = 0$. Whence $u = \frac{2}{3}V$, and therefore $v = V - u = V - \frac{2}{3}V$, or

$$v = \frac{1}{3}V \qquad \ldots\ldots\ldots \text{(L)}.$$

Hence the velocity required to produce the maximum effect is one-third of the greatest velocity at which the animal is capable of moving. This gives about two and a-half miles an hour for cart-horses, and five miles an hour for coach-horses, when working eight or nine hours a-day. The time thus obtained seems to answer very well for draught horses, but it is too long for mail-horses, where less effect but greater speed is required. It is easy to regulate this by the table. Thus, if a set of coach-horses have to run two stages of an hour each, or two hours on the whole in a day, then under 2^h, and opposite coach-horses, will be found 10.6^m, or about ten and a-half miles, the rate at which they may run without much injury, when slightly loaded, during one day of twenty-four hours, when well fed, and receive a good rest between the times of their running their prescribed stage. Since, by formula (A) $f = \mathrm{F}\left(\frac{\mathrm{V}-v}{\mathrm{V}}\right)^2 = \mathrm{F}\,\frac{u^2}{\mathrm{V}^2}$, and $u = \frac{2}{3}\mathrm{V}$, we have

$$f = \mathrm{F}\,\frac{\frac{4}{9}\mathrm{V}^2}{\mathrm{V}^2} = \frac{4}{9}\mathrm{F} \quad . \quad . \quad . \quad . \quad . \quad (l),$$

as already remarked, or the power at the maximum is four-ninths of the force exerted by the muscles at their greatest capability. This conclusion ought therefore to be attended to, when the greatest quantity of work is required from strong sound horses.

It will now be useful to show the addition of expense for a variation of velocity from the maximum of useful effect. Since the expense must be inversely as the effect produced, if the maximum, Table I., be taken for unity, then will be obtained

TABLE III.

Velocity.	Proportional Expense.	
Miles per hour.	Cart-Horses.	Coach-Horses.
0	Infinite.	Infinite.
1	1.48	2.55
2	1.03	1.48
2½	1.00	1.28
3	1.03	1.16
4	1.27	1.03
5	1.99	1.00
6	4.55	1.03
7	31.21	1.12
7½	Infinite.	1.19
8	...	1.28
9	...	1.53
10	...	2.00
11	...	2.80
12	...	4.76
13	...	10.26
14	...	25.57
15	...	Infinite.

From this table it will appear that, if a cart-horse walk at the rate of two and a-half miles an hour, the expense will be the least; but if slower or faster than this, the expense will be increased. Thus, at 5 miles an hour the expense will be doubled for a heavy cart-horse, while it will be the least for lighter coach-horses. The latter would be doubled at ten miles an hour, the usual rate of mail-coaches, consequently our mails are accelerated at great expense.

By comparing the three tables just given, a fair estimate of useful effect may be obtained, involving the velocity, duration of labour per day, and relative expense; and the proper value of each may be so chosen as to suit the object most particularly in view. Thus, a draught horse moving on a railway will produce the greatest effect at least expense, when moving at the rate of 2½ miles an hour, exerting a force of traction of nearly 175 lb. Table I. part 1. page 686. and will work eight or nine hours a day (Table II. page 688.), on an expense denoted by 1 (Table III. page 690), or the least possible expense.

If the velocity be increased to 4 miles an hour, the animal will be able to exert a force of 86 lb. only, work about three and a-half hours, at an expense of 1.27, or an increase of 27 per cent.

In like manner, similar consequences may be drawn for other velocities and for other kinds of horses.

Thus a coach-horse running at the rate of 10 miles an hour, can exert safely a force of traction of about 20 lb. (Table I. part 2.), can work two hours a-day only (Table II.), and that at an expense denoted by 2 (Table III.) that is, this velocity is obtained at an expense of cent. per cent., and so on of others.

It is not affirmed that the conclusions derived in this manner are strictly accurate in every case that may occur, but that they are approximations, which will be found useful in making estimates of animal performance, not far from the truth.

III. *On the most advantageous methods of applying animal power to the movement of Wheel Carriages.*

In order to determine a proper method of applying animal or any other power to the movement of bodies in general, a knowledge of the laws of friction is of the greatest importance. On this account much attention has been paid to the subject by men of talent and experience; but their exertions have not been attended with that degree of success which its importance seems to require, and which may yet, it is hoped, be attained. Though some ingenious theories have been deduced from a number of experiments which have been made, yet they have not in general been of great utility in practice. Some of the maxims thus deduced, however, may here be with propriety stated.

1. *The friction of hard bodies in motion is a uniformly retarding force.*

2. *That the friction of a body does not continue the same when it has different surfaces applied to the plane on which it moves, but that the smallest surface will have the least friction.*

3. *The quantity of friction increases in a somewhat less ratio than the weight of a body, though in general it may be taken at about the same, or as it is frequently enunciated, that the friction is proportional to the pressure very nearly.*

As both sledges and wheel-carriages are affected by friction, and as this may be increased or diminished, according as the direction in which any force is applied to produce motion is favourable or unfavourable, there must be a direction in which this force may be most advantageously applied. Proceeding on the foregoing principles, there may be demonstrated the following

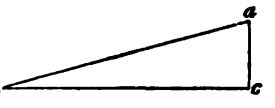
Proposition.

The power which moves a body along a horizontal plane acts with the greatest advantage when the line of direction makes an angle of $18\frac{1}{2}°$ with that plane.

Let b be a body which is to be moved along the horizontal plane bc, by a given power estimated in quantity and direction by the line ba.

Let fall the perpendicular ac, on the horizontal line bc, and make ab radius, equal to unity; then will ac become the sine of the angle abc, which may be conveniently represented by the variable quantity x. Then, by the principles of trigonometry, will bc become $(1 - x^2)^{\frac{1}{2}}$, which, by the resolution of forces in mechanics, will be the force moving the body horizontally. But the power, by its oblique action in the direction ba, diminishes the pressure of the weight on the horizontal plane, in the ratio of ab to ac, or as 1 to x; therefore bx is the part of the pressure taken off, and the actual pressure which remains will be represented by $b - bx$. Let the friction be equal to the $\frac{m}{n}$ part of the weight or pressure, which from many experiments may be estimated at $\frac{1}{3}$. Then in this case, the friction will be $\frac{m}{n}b - \frac{m}{n}bx$, and the force required to move b horizontally must be equal to the horizontal force exerted diminished by the amount of the friction, or it is $b(1 - x^2)^{\frac{1}{2}} - \frac{m}{n}b + \frac{m}{n}bx$. Now, when this is a minimum, or the least possible, its fluxion must be equal to zero, or $bdx - \frac{bxdx}{(1 - x^2)^{\frac{1}{2}}} = 0$. From this then will be obtained,

Fig. 14.



$$1 - \frac{m}{n} = \frac{m}{n}x^2 \quad \ldots\ldots \quad (M)$$

Therefore the sine of the angle $a\,b\,c$ becomes known when m and n are determined.

Since we have assumed $\frac{m}{n} = \frac{1}{3}$, then will $x = \sqrt{\frac{1}{10}} = 0.3165 =$ Nat. sine of 18° 26′, or 18½° nearly. If the plane along which the body is moved, be inclined to the horizon at an angle of elevation of which the cosine is denoted by c, the sine of the angle which the line of direction of the force of traction makes with the plane when it acts with the greatest advantage, will be

$$\frac{c}{c^2+9} \text{ nearly} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (m);$$

the radius being unity.

The principles assumed in the foregoing investigation, it must be admitted, are not of universal application, because there are many circumstances which modify the action of friction and cause considerable deviations, in certain cases, from those laws which are employed. Notwithstanding these objections, however, the results depending upon them are frequently deserving of attention. They will, in many practical applications, be of considerable utility, and ought therefore to be kept generally in view by those employed in the construction and management of carriages. Indeed, the line of draught thus determined is one of the reasons previously alluded to for making the fore wheels in four-wheeled carriages smaller than those behind to improve the line of draught; and such an inclination, besides, is more favourable for equalizing the pressure on the shoulder of the horse, being nearly perpendicular to its plane, or rather to that of the collar upon the shoulder, while, at the same time, the force exerted by the horse in this elevated direction, tends, in some degree, to raise the wheels over slight obstructions in the road. When a horse, too, is employed to pull a cart, he generally, in making a considerable effort, bends himself forward, inclines his legs, and brings his body nearer the ground, so that his effort will, in some degree, depend on his own weight, and that part of the load which he carries on his back; and it is therefore advantageous to throw a proper share of the load on the shafts, though too much would certainly be injurious. From what has just been said, it will appear that the size of the wheels must be adapted to the height of the animal which works in the shafts,

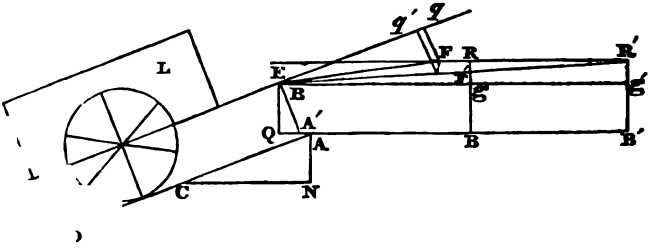
so that whether the road be exactly horizontal or somewhat inclined, when he bears forward in working, the traces may be nearly parallel to the road, but rather inclining upwards than downwards, because, in the former case, the friction would be somewhat diminished, as there will then be a tendency, in the force exerted by the horse, to raise the wheels out of any hollow into which they may fall, while in the latter, on the contrary, it will draw them downwards, and by this means increase the friction, and consequently the labour, unnecessarily.

If a cart or carriage be drawn by several horses walking before each other, the length of the traces has considerable effect on the draught when the inclination of the road changes greatly. This effect may be computed by the following method after the manner of Prony.

Let DA be the line of direction in which the cart and *shaft* horse are moving, and AB that in which the trace horse is moving, having a considerable difference of inclination to the former; then, by dynamics, the effort of the horse pulling in the direction AB will be decomposed into two parts, of which one tends to move the load, the other to pull down the shaft-horse drawing along the slope DA.

The resultant in the latter direction becomes greater in proportion as the traces of the leading horse become longer, and its increase may be thus determined.

Fig. 15.



Let EA be the height of the breast of the horse working in the shafts near the point A, above AD the line of motion, and suppose ER and ER′ to be two different lengths of the traces, at each of which the breast of the horse is at the same distance from the plane AE, and consequently ER, ER′, and EA, are

all equal. Now, if EF be taken equal to EF′ to represent the effort of the horse in the direction of the trace, and Eq be drawn parallel to DA, EQ perpendicular to BA produced, Eg parallel to AB, and Fq, F′q' perpendicular to Eq. Then, the effort which tends to pull down the horse whose breast is at E will be represented by Fq, when the breast of the other horse is at R, and by F′q' when it is at R′, while qE, q'E′ are the corresponding efforts tending to raise the load along the inclined road DA.

Let the perpendicular heights EA, RB, R′B′, be represented by a, the distance ER by l, and ER′ by l', the angle A′EQ, or qEg, the supplement of DAB equal to s, and EF or EF′ equal to f, then the effort which tends to pull down the shaft horse in the trace ER when he just reaches the summit of the slope, will be $f \sin qEF = f \sin (qEg - FEg)$, while the effort tending to raise the load will be $f \cos (qEg - FEg)$. When the foremost horse draws by the trace ER′, the effort to depress the shaft horse will, in like manner, be represented by $f \sin (qEg' - F'Eg')$, and that which tends to draw up the carriage by $f \cos. (qEg' - F'Eg')$.

But $\sin F'Eg = \frac{Rg}{ER}$, and $\sin FEg = \frac{R'g'}{ER} = \frac{Rg}{ER'}$, and $Rg = BR - EQ = a - a \cos s = a(1 - \cos s)$. The angles FEg, $F'Eg$ are always so small that the arcs differ little from their sines, therefore $FEg = \frac{a(1 - \cos s)}{l}$, and $F'Eg' = \frac{a(1 - \cos s)}{l'}$. Now, by substituting these values in the preceding equation, there will be obtained—

$$Fq = f \sin \left\{ s - \frac{a(1 - \cos s)}{l} \right\} \ldots\ldots\ldots\ldots (1)$$

$$F'q' = f \sin \left\{ s - \frac{a(1 - \cos s)}{l'} \right\} \ldots\ldots\ldots\ldots (2)$$

$$Eq = f \cos \left\{ s - \frac{a(1 - \cos s)}{l} \right\} \ldots\ldots\ldots\ldots (3)$$

$$Eq' = f \cos \left\{ s - \frac{a(1 - \cos s)}{l'} \right\} \ldots\ldots\ldots\ldots (4)$$

Let AB be the horizontal plane, and DA the ascending road, which has a rise of 1 foot in 6, or that CN is 6 feet, while NA is 1 foot, which can be the case in a road rising from wharfs, mines, or quarries only.

In this case the angle s will be about 9° 28′, which, in decimal parts of the radius, gives, $s = 0.16522$, and $\cos s = 0.98638$. Let $a = 3\frac{1}{2}$ feet, $l = 8$ feet, $l' = 12$ feet, and $f = 200$ lb. There will then result from the preceding equations,

$$F q' = 200 \sin \left\{ 0.16522 - \frac{3.5\,(1 - 0.98638)}{8} \right\} = 31.716 \text{ lb.} \quad \ldots (1)$$

$$F' q' = 200 \sin \left\{ 0.16522 - \frac{3.5\,(1 - 0.98638)}{12} \right\} = 32.250 \text{ lb.} \quad \ldots (2)$$

$$E q = 200 \cos 9° 7' 29'' \ldots = 177.470 \text{ lb.} \quad \ldots (3)$$

$$E q' = 200 \cos 9° 14' 29'' \ldots = 197.404 \text{ lb.} \quad \ldots (4)$$

In which the angles in the two last expressions are obtained from the expressions within the parentheses reduced in the first two.

From the first two of these it appears that the shaft horse, whose breast is at E, must, in the circumstances supposed, be pulled downwards by the other trace-horse, with a force of about 32 lb., which, for a horse not fatigued, is of little importance, but must be very sensible when the animal is much exhausted, after a severe pull up a steep road, or at the end of a hard day's work. From the first and second of these it is found that a lengthening of the traces from 8 feet to 12 feet produces an increase of 32.25 lb. — 31.716 lb. = 0·534 lb. or somewhat more than half a pound in the effort, tending to pull the shaft horse down; and, from the third and fourth, a diminution of 197.470 lb. — 197.404 lb. = 0.066 lb. in the effort to raise the load.

Though these quantities are inconsiderable when f is moderate, yet a horse will increase f, for a few minutes, to 400 lb. or 500 lb. which would increase the force to pull the shaft horse dow[illegible] two or three times the quantities stated above, and renders, [illegible]v that means, such a situation very injurious.

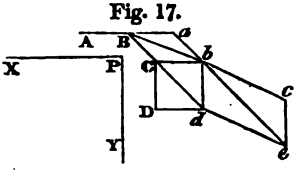
When several horses are harnessed together, it is better to [illegible] ab[illegible]ast as much as possible, than in an extended line, [illegible] either up an inclined plane, as was shewn [illegible] urns round the corner of a street or road, [illegible] right angle, as will now be demon-[illegible]

Let PX, PY [illegible] the directions of the sides of the streets at right angles to each other.

Also, let AB represent the force and direction of the shaft [illegible] BC that before it, and CL the third, making the angles

ABC, BCD equal to one another, and to 135°, so that AB may be in the direction of the one street or road, and CD in the other.

Fig. 17.



Then, by the composition of forces, B*b* will be the united force and direction of the two first horses, and *b e* that of all the three.

This last will be equal in effect to $2\frac{2}{3}$ horses nearly, instead of 3, and making an angle of 45° with PY, the new direction of the road, supposing the three horses pulling equally. Hence there will be about $\frac{1}{3}$ of the power of a horse lost, and the direction changed only half of what it should be, or making an angle of 45° with PY, instead of being parallel to it.

To perform this more accurately than by a graphical operation, we have, by dynamics,

$x = f(\cos 0° + \cos 45° + \cos 90°) = f(1 + 0.70711 + 0) = 1.70711 f$ ... (1)

$y = f(\sin 0° + \sin 45 + \sin 90) = f(0. + 0.70711 + 1.0) = 1.70711 f$ ... (2)

$R = (x^2 + y^2)^{\frac{1}{2}} = 2.414 f =$ the conjoint effect, ... (3)

$\frac{x}{y} = 1 =$ tan 45° = the inclination of *b e* to PY,..... (4)

Now, if the force exerted by one horse, or $f = 200$ lb., that of the three, when pulling in the same direction, will be 3×200 lb., . . . = 600.0 lb.

But, from equation (3), when in the direction above supposed, it will be 2.414×200 lb., ... = 482.8 lb.

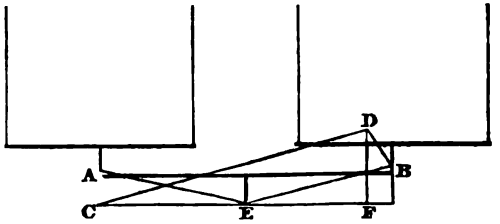
The difference or loss will be, . . = 117.2 lb.,

or about $\frac{1}{5}$ of the force exerted by one horse. Hence it appears that a very considerable part of the effort exerted to draw a cart or waggon, in such circumstances, must fall upon the shaft horses, while those preceding them must exert little, otherwise they act unfavourably both in force and position. Examples of this kind may be frequently seen in London, when large coal waggons, &c drawn by about six horses, are moving up from the wharfs, and which must suddenly turn and take the direction of a street, at right angles to the lane in which they are moving, when the shaft horses are exerting the force required to move the waggon, while the trace horses are doing nothing.

The last thing to which attention will at present be directed, is the mode of attaching horses to carriages, more especially before the shafts. The methods indeed are different in different countries, and it is somewhat difficult to determine the best.

When horses are harnessed to draw side by side, they are usually yoked to the opposite ends of a bar, which acts as a lever. This may be divided in the ratio of the horses strength, by the fulcrum (which is the point secured to the end of the pole in carriages), so that the stronger horse being attached to the shorter end of the bar, will thus be only able to counteract the smaller force of his weaker companion. But even without the inequality

Fig. 16.



of the lengths of the bar, a compensation takes place, for the centre on which the bar turns is always sensibly behind the points of attachment of the horses; so that, when one of them falls back a little, the effective arm becomes more perpendicular to the direction of this force, and gives him a greater power, while the opposite arm becomes more oblique, and by that means causes the other horse to act at a disadvantage, thus producing a kind of stability in the equilibrium between the trace horses. When either horse advances so far that the bar AB takes the position CD, the foremost horse has the disadvantage of acting on a lever equivalent to EF only, while the other horse acts on a longer lever EC. If the fulcrum E were farther forwards than the extremity of the bar A or C, the two horses could never draw conveniently together.

It may be remarked here, that when the plane on which a carriage moves, and the line of draught, are both horizontal, the advantage derived from the use of wheels for surmounting a [illegible] object, of a given height, in the surface of a [illegible] the square root of the radius of the wheel, as has already been shewn in a former Number of this Journal, by my friend Mr A. G., in an ingenious essay on the Roller. Whence it is obvious that an increase of the diameter of the wheels, as far as the size of the horse will permit the line of draught to retain the best position, formerly demonstrated, will be advantageous to the free and easy motion of wheel carriages.

ON THE PROBABILITY OF THE REVERSION OF WHEAT INTO GRASS. *By Mr WILLIAM BLACKADDER, Glammis.*

WHEN I was at the Trinity Muir market of Brechin in June last, Mr David Scott, of Newton, near Arbroath, came to me, and inquired if ever I had heard "*that if the smut balls of wheat were sown, they would vegetate?*" and, on answering in the negative, Mr Scott stated, that Mr Strachan and Mr Bell, farmers near Montrose, had sown them for some years, and the balls had always sprung, but had never advanced to maturity until this season, when some had actually flowered, and appeared to be a grass; and that he had requested a specimen to be brought to the market for my inspection.

Just at this period of the conversation Mr Bell made his appearance, and produced a specimen, which I recognised to be a species of *brome;* and on questioning Mr Bell minutely as to the mode of its production from smutted wheat, I was satisfied that little, if any, doubt could be entertained of the fact. The discovery that smut-balls vegetated was first made by Mr Strachan, and then experiments were tried by Mr Bell; that the experiments had been continued for years; but the balls having been usually sown in spring, they had never had time to flower. Last year, however, they were sown in the autumnal wheat seed-time, part of which flowered this season, of which the one produced was a specimen.

On my return home, I compared the specimen with the family of the *bromes*, in a herbarium of the British graminæ, which was prepared for me by the late celebrated Mr George Don of Forfar, and which has been frequently examined by eminent botanists, and much prized: but although it possessed the general characters of a *brome*, it did not exactly coincide with any of the individual species in the herbarium. It then, for the first time, occurred to me, that it might more nearly agree with the *giant fescue*, and on turning over to it, found this conjecture to be correct. Now this species was placed by Linnæus in the *brome* family, but removed to that of the *fescue* by Sir James Smith, whose authority is now followed; and it

may be here observed, that in the natural system of Jussieu, the *wheat* is made the intermediate link between the *fescue* and the *brome.*

In the course of the season, I had mentioned the above particulars to various of my scientific friends, to whom I stated my conviction of their truth, not only from what I had learned from Mr Scott, who is well versed in botany, but also from the circumstance, that, some years ago, when passing through a field of young grass, on the farm of Dysart, in the same district, which had been sown among wheat, I found a large tuft of the giant fescue, and was puzzled how it had got there; and it also occurred to me, that if the brome was the type of our cultivated wheat, that other species might also spring from different diseased states of it, and particularly the one which infests it so much, notwithstanding the care usually taken to screen it out of the seed.

Latterly, having been urged to make farther inquiry into the original facts, and having occasion to be lately in the neighbourhood of Montrose, I called upon Mr Bell; but his tuft of grass had been accidentally destroyed only a few weeks before. He, however, readily offered to accompany me to inspect what belonged to his neighbour, Mr Strachan; and on our way, I was glad to learn from him, that the *common brome* (provincially named *sleepies* in that quarter, from the opinion that the bread made of its flour is conducive to sleep), had also made its appearance from the diseased seed; and that smutted wheat, sleepies, and another grass, had all grown from the smutted wheat-balls sown in the previous autumn; neither the wheat nor the sleepies having been in flower when I had met Mr Bell at Trinity-Muir market.

On our arrival at Balgove, Mr Strachan took us into his garden, and we there saw a tuft, the produce of smutted wheat-balls, consisting of a mixture of smutted wheat, sleepies, and another grass, but the latter not in a state to be accurately recognised, farther than it was a *brome;* and, at some distance, he shewed us another tuft, which consisted partly of sound wheat, and partly of smutted balls, and which was the produce of winnowings, or small wheat, but clean and not smutted. Mr Strachan also shewed us some newly brairded from smut, sown

this season, to see what may be the result next year, there being a bet depending on it in Montrose. He has also sown some of the seed of the *sleepies;* and Mr Bell is likewise continuing his experiments.

On inquiry, Mr Strachan, who is now an aged man, informed me, that, fully twenty years ago, he happened to throw out a mixture of small and smutted wheat to the poultry, at a distance from the dunghil, and that, some time afterwards, he was surprized to observe a strong tuft of *grass* springing up; for, as he justly concluded, it was very unlikely that the fowls would leave any of the grain; and it then occurred to him, that smut-balls would certainly vegetate, which he has repeatedly verified since that time by direct experiments; and his neighbour Mr Bell, having seen these, also began, six or seven years ago, to make similar experiments, and which have been attended with similar results; but as the sowing always took place in spring until last year, the plants had never flowered.

It seems that particular care is necessary in sowing smut-balls, that none of them be in the least injured or broken; and also if they get much rain or damp before they sprout, they will be destroyed; and to avoid risk, Mr Strachan sometimes places the entire head into the soil, without taking the balls out of the ear.

On comparing a specimen of these *sleepies* taken from Mr Strachan's tuft with the *bromes*, in my herbarium, I find it to be the *Bromus multiflorus*, and to which Mr Don has appended the remark, "*common in wheat-fields.*" Another specimen has the appearance of the *Bromus mollis*, but is so much decayed, that it cannot be accurately referred to. The unfortunate destruction of the tuft raised by Mr Bell, prevented me ascertaining whether there had been any more of what resembled the *giant fescue.* In regard to the origin of these specimens, the facts are as above narrated; and if they are hereafter verified by others, besides explaining very satisfactorily the cause of the brome-grass being such a frequent weed in wheat districts, will give rise to the new and interesting view in vegetable physiology, that, after a certain stage of cultivation, a limit takes place, beyond which cultivation cannot be carried; and that plants are subject to what may be termed a disease, in respect to the wants

of man; but which limitation may perhaps be a provision in nature, to revert the cultivated grains back into their original type.

From the neat condensed view of the opinions of many eminent practical men and naturalists upon smutted wheat, given in a late number of this Journal by Mr Donaldson, the mystery of its origin, its nature, and inveteracy of cure, are set forth in a very lucid manner. No notice, however, is taken of the vitality of smut, so as it can reproduce grains or grass; neither have I been able to trace that fact elsewhere, and Mr Strachan's discovery appears, therefore, to be entirely new. From his experiments it may be inferred, that smut is, at least, in certain cases, produced from light seed, and that its vitality is not destroyed, but merely impaired from producing healthy wheat, as some stalks of it reproduce smutted balls, and others healthy brome seeds, which bear a strong resemblance to rye; and, as justly remarked by my friend, the Rev. John M'Vicar, these different states of the balls become objects of much interest. That the *brome* of botanists is the *true type of wheat*, the present experiments certainly do not warrant, for the change may be merely an intermediate step. As, however, neither *wheat* nor *rye* has ever yet been found in a *native* state, it is to be hoped that Mr Strachan's discovery will attract the serious attention of naturalists, and the results to which it points be fully investigated; and it is with such a view only that I have been induced to draw up the preceding narrative, being well aware that it will be received with much incredulity *.

* It may be right to notice that, in the experiments here described, no precaution seems to have been taken to provide against the possible existence of the brome or the fescue seed in the soil in which the smutted wheat was sown. The experiments cannot, therefore, be regarded as conclusive. Farther, when we consider that the brome-grasses have a panicled inflorescence, while the wheats are spiked, and that the glume of Bromus is many-valve, while that of Triticum is bi-valve only, we ought not readily to admit the probability of the one genus passing into the other, even by crossing of pollen, far less by accidental disease. Nevertheless we should like to see the statements contained in this paper either verified or refuted by accurately conducted experiments.—Editor.

ON THE PURCHASE OF HORSES.

Advice to Purchasers of Horses. By J. STEWART, Veterinary Surgeon, and Professor of Veterinary Surgery in the Andersonian University. 12mo. Glasgow 1833.

THIS is a well composed and useful little volume, intended to assist purchasers in the uncertain paths of horse purchasing, and to enable them to defend themselves against the deceptions of that generally most wily and unprincipled class of dealers termed "horse-coupers." It contains a general description of the structure of the horse, and of the peculiar conformation best suited to the different purposes to which the animal may be intended to be applied,—an account of the several diseases and evil qualities which constitute unsoundness and vice, and the symptoms by which they may be discovered, together with a statement of several of the deceptions practised by horse-dealers, and the means of detecting them. This is all given in a concise, distinct, and judicious manner, well calculated to be useful. It will not indeed, as no book will, supply the want of experience, but it will enable persons to turn their experience to the best advantage, and will put those who have none on the best course for avoiding the evils of the want of it, and, altogether, we hesitate not to recommend it strongly to those who may have occasion to deal in the article of horse flesh. The volume further contains a chapter on the law of warranty, which the author, judiciously remembering the adage "Ne sutor ultra crepidam," has quoted from another work. Unfortunately, however, he has taken it from a publication having reference solely to *English* law; and, although the general doctrine of warranty, and the rules as to soundness and unsoundness, are almost the same in both countries, there are one or two relative points touched upon as to the law of sale in which the laws differ, and as to which the statements quoted by our author might be apt to mislead. With this exception, the treatise is well worthy the attention of our readers, though in general we would recommend to all gentlemen and farmers, however much they may

plume themselves in their skill on this subject, and whatever advantage they may derive from books, in purchasing a horse, particularly from a dealer, to have recourse to the opinion of a veterinary surgeon, whenever there is within reach one properly qualified, and not himself a dealer.

We are glad to take this opportunity of expressing our satisfaction at the establishment in the Andersonian University of Glasgow, of a chair for veterinary surgery. The eminent advantages which have resulted from the Highland Society's School in Edinburgh, under their excellent lecturer Mr Dick, not only to that city, but to Scotland, make it a subject of much gratulation that a similar school has been established in the metropolis of the west, where this branch of science, both as to theory and practice, has long been, and still is, at a low ebb, though a visible improvement has of late years been made by several agricultural associations, having settled pupils of Mr Dick in their respective districts. Mr Stewart, who has recently been appointed professor of veterinary surgery in the Andersonian University, is, we believe, every way qualified to rescue the science from its present condition in that part of the country. After spending some years at the school in Edinburgh under Mr Dick, he entered the Royal Veterinary College of London, where he took his degree, having displayed much talent and knowledge of his profession, and the style of his present publication shows his capacity of embodying his instructions in appropriate language, so as, we doubt not, to produce an excellent, agreeable, and useful course of lectures.

ON AGRICULTURAL STATISTICS. *By Mr WILLIAM HAWKINS, Hitchins, Hertfordshire.*

It is the object of this paper, to show the value of an accurate acquaintance with the present state of agriculture in this kingdom, and to suggest the means of obtaining it.

The subject derives its principal importance, from the proportions existing between the number of the people, and the supply of food.

I subjoin a table showing, for the four decennial periods at which the census has been taken, the number of the people to be fed—the number of families employed in raising food for them—and the quantity of wheat imported on an average of the five preceding years—the figures in the table having reference to England and Wales only.

	Population.	Families chiefly employed in Agriculture.	Average quarters of Wheat imported in the five years ending 1st January.
In 1801, .	9,168,000		652,000
1811, .	10,502,000	770,199	683,000
1821, .	12,218,000	847,957	768,000
1831, .	13,894,000	834,543	1,542,000

From which it appears that we are outgrowing our means of subsistence, derived from the soil as at present cultivated.

Comparing 1821 with 1831, it appears that the number of families employed in agriculture, has been so far from keeping pace with the number to be fed, that it has positively diminished.

If the hands employed in cultivating the soil in 1821 had been capable (as they were not) of maintaining the population of that period, and if the hands now so employed be reckoned equally productive, we should have about 1,800,000, or between one-sixth and one-seventh of the population dependent on foreign supply; because, speaking in round numbers, as 847,000 (the number of families then employed in agriculture), is to 12,200,000 (the number of people then existing), so is 834,000 (the number of families now employed in agriculture), to 12,100,000, which is less by 1,800,000, than the people now existing, and who must therefore live on food imported.

The Agricultural Committee of the last Session of Parliament have reported, that they are satisfied by the strongest concurrent testimony from different parts of Great Britain, that the occupiers of the inferior soils, especially of heavy clay land, have of late expended less capital and labour in their cultivation, and that this neglect has caused a diminution in the gross amount of produce; and that the productive powers of those

inferior soils have been impaired; and that in some cases their cultivation has been entirely abandoned.

Mr Jacob states in his evidence (which the Committee have adopted and embodied in their Report), that there is a lessening in the stocks of corn in the hands of all the farmers and corn dealers; that in 1816, when the harvest was so deficient, we had six months consumption on hand; that since 1829, we have never had at harvest time so much as one month's consumption on hand; and that if the harvest of 1816 should come over again, the deficiency could not be supplied from the whole world; and that we are about four weeks in the year deficient in our growth upon the average amounts.

And it must be observed, that this is not the unsupported opinion of Mr Jacob, but the Committee introduce it as part of their report, and add that his general view is confirmed by the local experience of occupying farmers throughout England.

Mr Jacob states, moreover, that in 1828 when the Duke of Wellington was minister, he was very much alarmed respecting the harvest, and desired Mr Jacob to obtain for him information throughout the kingdom; that he has *no possible means of judging whether the home growth is increasing or diminishing on an average of years;* and that excepting the returns of the averages under the Act of Parliament, there is no information collected by the Board of Trade relative to the agriculture of the country.

This is the present state of things, and it would be a very dangerous one, even if our population were stationary; but when that element is taken into account, the danger becomes infinitely greater. We are increasing in number at about the rate of 15 per cent. in ten years, whilst the produce of our soil appears to be getting less. In 1841, we shall have about 2,000,000 more people than we had in 1831, which, according to the present average, would require that 4,000,000 acres of fresh land should be brought into cultivation; whereas the Committee informs us, that lands are thrown out of cultivation every year, and that the productiveness of the lands still cultivated is less than it was.

It seems from the Committee's Report, that we now grow

corn enough for eleven months' consumption only; but it is perfectly plain that the same quantity of corn which will keep 14,000,000 people for eleven months, will keep 16,000,000, the probable number in 1841, for only nine months and three weeks.

If the statements of the Committee be true, these deductions are inevitable, and it behoves our statesmen to inquire whether this dangerous state of things be remediable or not.

Now, I conceive, that annual returns of the actual state of our agriculture, would supply most of the information requisite for enabling them to solve that, as well as many other interesting problems.

I propose, therefore, that, at the proper season of the year, a number of printed forms should be issued from the Home Department, or the Board of Trade, to the Clerk of the Peace for each county, who should transmit them to the overseers of the parishes. The overseer should deliver a copy of the subjoined form, entitled "Occupier's Return," to every occupier of land in his parish, which the occupier should be required to fill up and return to him by a given day; and, having received them all, the overseer should embody them all into his own return, which I propose should be in the form also subjoined, and marked "Overseer's Return." And having verified them before a Magistrate in the same way as is now done with the population returns, he should again transmit them to the Clerk of the Peace. That officer should make a digest of them for the whole county, and then send all the papers to the Government, whose business it should be to arrange the whole in a clear and tabular form, and publish it in the Gazette. If the forms were issued in May, the tables might be ready for publication by the end of August. The following are the forms suggested: perhaps it might be prudent to begin with requiring information upon one or two points only, and gradually extend it to the rest, but that I shall leave to the consideration of Mr Rickman, who is probably the fittest person living for managing a matter which would require so much zeal, tact, experience, and accuracy, as at the beginning this certainly would.

SAMPLE OF "OVERSEER'S RETURN."

County of Hertford, Parish of St Mary.

Number of acres in the parish, ...		4000 acres.
Occupied by private individuals,	3500 acres.	
Not so occupied, ...	500	
	4000	

Land occupied by private individuals, of which there are in—

Wheat, . .	500 acres.	Brought over,	1450 acres.	
Barley, . .	400	Clover, ...	250	
Oats, . . .	250	Lucerne, . . .	0	
Rye, . . .	0	Sainfoin, . . .	0	
Peas, . . .	50	Mangel Wurzel, .	5	
Beans, . . .	50	Pasture, . . .	1695	
Turnips, . .	200	Fallow, . . .	100	
Carry over,	1450	Total,	3500	3500

Second crops in one year.

Turnips after tares, 10 acres; potatoes after tares, 5 acres.

Land not occupied by Individuals.

Common, ...	100	
Water, ...	0	
Bog, ...	100	
Heath, ...	300	
	500	500
	Grand total,	4000 acres.

The total number of occupiers of land in the parish is, . 100

Occupiers of less than .	100 acres, .	40
[illegible] 0 acres and less than	50 .	25
[illegible]	00 .	25
[illegible]	500 .	9
[illegible]	. . .	1
		100

[illegible] each of the following crops is, per acre, Wheat 24 bushels; [illegible] Barley 36; Potatoes, 240.

[illegible] employed in or intended for

agriculture, 100; cows, oxen, and calves, 100; sheep and 2500; pigs, 500.

Observations.—It is supposed that the 100 acres of bog migh claimed and made to bear wheat, but that the heath is fit for t

The quantity of potatoes grown in the parish has increased of late years. . . . . .

There is more corn grown now than formerly, in consequenc enclosure of a common ten years ago.

And for the same reason there are fewer cows kept, so that t complain of not being able to get milk.

SAMPLE OF " OCCUPIER'S RETURN."

. . . . .

County of Hertford, Parish of St Mary. . . .

How many acres of land did you occupy in this parish on the instant? . . . . . (Suppose) 50

How many acres were there of

	Brought up,	Brought up,
Wheat, . . .	Cabbages, .	Wood, . . .
Rye, ...	Tares, . .	
Barley, . . .	Clover, . .	(Here insert any
Oats, ...	Sainfoin, .	other crops which
Peas, ...	Trefoil, . .	you may happen
Beans, . . .	Lucerne, . .	to have.)
Potatoes, . .	Hops, ...	
Turnips, . .	Grass, . .	
Carrots, . . .	Sheepwalk, .	
Mangel Wurzel,	Fallow, . .	
Carry up,	Carry up,	Total, . . 5(

If you have had, or intend to have, two crops of any number this year, as, for instance, tares and then turnips, put that number in the above list, under the head tares only, and put the turnip form underneath:—

Second crop this year.	No.
Turnips after tares, ...	
Ditto after fallow, ...	
Total, . .	

How many of each of the following animals had you on the 1st.

	Nu
Horses, mares, colts, intended for agriculture, . . .	
Cows, oxen, and calves, ...	
Sheep and lambs, ...	
Pigs, ...	

How many of each kind have died of disease within a year from the 1st July?

	Number which have died of Disease.
Horses, mares, colts, ...	
Cows, oxen, and calves, ...	
Sheep and lambs, ...	
Pigs, ...	

If you hold land in any other parish, you will return the number of cattle in only one of them; and, in your return for that other parish, state that the number of cattle is returned in this parish.

One year with another, what do you consider to be a fair average crop on your land in this parish, of each of the following sorts of produce,—

	Bushels.		Bushels.
Wheat, ...		Oats, ...	
Barley, ...		Potatoes, . . .	

Do you consider the following crops to be likely this year to yield an average return, or more or less than average:—

Wheat,
Barley,
Oats,

Insert here any remarks you have to make upon the state of agriculture in your neighbourhood.

I, , *do declare the foregoing answers to be true and accurate, to the best of my knowledge; as witness my hand this day of July* 1834.

If we had possessed returns like these for the last thirty years, we should now have a more complete view of the state of our agriculture than any nation ever possessed; and I am inclined to think that much false reasoning, and some mischievous legislation might have been spared us.

It uniformly happens, that many beneficial consequences result from the acquisition of sound knowledge, which nobody can foresee; and there is no reason to think that a knowledge of statistics will offer any exception to the rule. The few practical inferences which have occurred to me are offered, therefore, as a sample, and not as a catalogue, of the advantages to arise from the possession of such returns.

Steadiness of Price.—The Committee give it as their opinion, that steadiness of price is the great object never again to be overlooked; and they make it a great merit in the present corn laws, that they have produced a steadiness in the price of corn,

of which there has been rarely, if ever, an experience in any former period of equal duration; and yet,

In 1829, the price of wheat per quarter was, on the 2d January,	L.3	15	11
On 30th October,	2	15	4
Variation within ten months,			L.1 0 7
In 1830, the price of wheat per quarter, was, on the 1st January,	L.2	15	5
On 30th July,	3	14	11
Variation within seven months,			0 19 6
In 1831, the price of wheat per quarter, was, on 18th February,	L.3	15	1
On 21st October,	2	19	2
Variation within eight months,			0 15 11

Under circumstances, therefore, the most favourable to steadiness of price, it has fluctuated very materially. That fluctuation has arisen partly from the quantity having been variable, and partly from its having been unknown; but the knowledge to be acquired from these returns would reduce both these causes of fluctuation. It would tend to produce a *uniformity of supply*, by exhibiting the quantity grown in the two or three preceding years; and by thus giving farmers the means of judging whether the price was likely to rise or fall in the ensuing year, would enable them to sow more or less, according as the demand was likely to be greater or less than the average; and a steady price at home would certainly produce a steady supply from abroad; whereas at present, the home as well as the foreign growers have no means of proportioning the supply to the demand; and the supply (were it greater or less), being known immediately after harvest, the price would at once fix itself for the whole season. Capitalists and dealers would be ready to buy whenever the price got lower than the average of the season, and to sell when it got higher. Between different seasons, therefore, and also between different parts of the same season, it would tend strongly towards producing steadiness of price. The trouble taken by each individual farmer in making his returns, would be richly compensated by the additional security given to his dealings. To the public in general the information thus obtained would be clear gain.

Amongst other advantages of steadiness of price, it would make the taking of long leases a matter of much less uncertainty than at present, and, by encouraging the granting of such leases, it would improve the cultivation of the soil.

We should be preserved from *unfounded* alarms of scarcity, such as were felt in 1816 and 1828; and we should be warned of, and have time to prepare against, a *real* scarcity, and possibly be thereby preserved from famine.

Whatever fluctuation in price might, in fact, take place, we should know to how great an increase or diminution of supply it was attributable; and then we could argue conversely, and shew how great a variation in price would be likely to be occasioned by any given alteration in quantity.

Corn Laws.—One of the most powerful reasons for keeping up by law the price of corn, is to prevent the agricultural labourers from being thrown out of employment. The effect of their repeal might be much more accurately appreciated, if we had the power of knowing *how much* land has been thrown out of cultivation by the fall in price which has taken place, and in what parts of the kingdom, and what has been the effect on the poor-rates.

Taxes, Tithes, &c.—We could measure the effect on cultivation of the commutation of tithes, or the repeal and imposition of particular taxes, and, for instance, those on malt, beer, spirits, wines, &c.

Steam power and Railway communication seem to be on the point of general adoption; and it would be interesting and instructive to mark their effects, particularly the gradual withdrawal of land from producing food for horses, and employing it in the more immediate service of man.

Many other points of great interest would be elucidated. We should be able to observe the gradual spreading of new crops or modes of cultivation—the alterations in taste or diet—the change from beer to tea and coffee—from bread to potatoes—from barley or oaten to wheaten flour—the quantity of meat consumed. Many of these and other variations now perhaps escape attention altogether, and with them their causes and consequences.

Without having exhausted the subject, or even all I have to say upon it, I think I have said enough to shew that the pro-

posal is very well worth a trial; so well indeed, that, in former times, I should have taken for granted that it would *not* be attended to; but, from the "Reform Ministry and the Reformed Parliament," we are entitled to hope better things, if their performance bear any reasonable proportion to their promises.

REMARKS ON VEGETABLE PHYSIOLOGY. *By Mr* MAIN, *Chelsea.*

(*To the Editor of the Quarterly Journal of Agriculture.*)

I BEG to make a few observations which have occurred to me on reading the favourable notice you have been pleased to take of my little book on Vegetable Physiology lately published. There is a very material passage in which I have been evidently misunderstood. The passage referred to, is as follows:—"The organic tissue of plants is perspicuously described with reference to the leading idea that the expansion of the cellules constitutes the development of the vegetable. This idea, however, is manifestly erroneous; for if a plant increased in size in consequence of the enlargement of its cellules, a tree four feet in diameter must have cellules proportionally larger than one of four inches, which however is not the case."

Now, it is impossible that I, or any other person in the least acquainted with vegetable structure and processes, could entertain for a moment so wild an idea. What I have represented respecting the expansion of the cellular membrane occurs in p. 3, viz. "Each cell is an insulated vesicle, having a thin, pellucid, elastic integument; originally inconceivably minute, but capable of being distended to a *limited* size, but in a definite order incident to the plant." This short quotation shews, that I could have no notion that a cell continued to be enlarged from year to year; on the contrary, I am quite certain that a cell only expands during the growing season of one year, and when the growth ceases it remains ever after unchanged so long as it remains sound. This observation applies to the cellular membranes of perennial stems of shrubs and trees. In the case of annual stems the process is different; the infant plant starts from a seed or from a perennial root; the cells, and tubes, and fibrous tissues, are elongated and expanded into form more or less, as

the soil or season prompts, and when perfect the whole stem dies. The growth of trees consists in the lengthening of the points of the branches, and, at the same time, an enlargement of the diameter of the stem; the former are developed as are the annual stems above alluded to, but do not die: the latter is caused by the development of a membrane between the wood and the bark during the growing season, and when perfect in the month of September, (sooner or later,) all its cells, and vessels, and fibrous structure are complete, and remain ever after incapable of farther accretion, and can only be changed by decay.

These are the ideas respecting the development of the cellular membranes of plants, which I intended to convey; and I have only to regret, that my want of sufficient power of language, and the studied briefness of my essay, should have left what I have advanced liable to misapprehension. I am well aware, and indeed prepared, to meet opposition on several of my opinions; not only because they differ from those of many high physiological authorities, but also because new opinions which threaten to disturb old settled doctrines are always unpopular and tardily received. All I ask or dare to expect is a fair hearing; and, if proofs be sought from Nature herself, I have no fears of her answers. One thing I can vouch for, and that is, if the result of such investigation gain me no proselytes, it will be productive of something of more value to the inquirer, viz. a clearer view of the physical constitution of plants, and probably a more perfect insight into the phenomena of vegetation than has hitherto been attained either by others or myself.

ON THE KINDS AND QUANTITIES OF GRASS-SEEDS SUITED TO [illegible]ATE HUSBANDRY, PERMANENT PASTURE, PLEASURE [illegible]ROUNDS, &c. *By Mr* CHARLES LAWSON, *Seedsman to the Highland Society of Scotland.*

THE land kept in sown grass, whether for pasturage or forage, must always, in this country, form a considerable portion of the whole land in tillage; and a knowledge, therefore, of the proper kinds and quantities of seeds for sowing off such lands must be regarded as of some importance. But the subject is by no means generally understood. In various works and

papers, indeed, the laying down of land to grass is treated of at large, but the kinds and quantities of seeds suited to different soils, and for different purposes, have not been distinctly pointed out; neither has a sufficient variety of soils and circumstances been attended to, so as to make them practically useful.

For a number of years my attention has been directed to this subject; and in furnishing grass-seeds for sowing land, I have been in the habit, in the majority of cases, of making a selection of them myself. In most cases, too, I have examined the subsequent crops myself, or the general results have been communicated to me. By these means I have been enabled, from time to time, to observe the kinds and quantities of the mixtures suited to different soils and situations. The subject is one, indeed, upon which a great deal yet remains to be done, by careful and minute trials and comparisons. I am accordingly still prosecuting the subject. But, in the hope that the progress which I have already made in it may be of some utility, I present the results of my experience in the condensed form of tables, drawn up to suit a number of those circumstances in which the laying down of land to grass occurs.

The plants which I have occasion to refer to in the tables are the following, with their period of flowering and habitat in their wild state, which shew generally their natural characters.

GRASSES.

Agrostis stolonifera—***Marsh Bent Grass or Fiorin.*** Flowers in July and August. Perennial. Grows in moist pastures.

Agrostis vulgaris—***Fine Bent Grass.*** Flowers in June and July. Perennial. Grows in dry pastures, banks, &c.

Aira flexuosa—***Waved Hair-grass.*** Flowers in July. Perennial. Grows on heaths and hilly places.

Alopecurus pratensis—***Meadow Foxtail-grass.*** Flowers in May and June. Perennial. Grows in meadows and pastures. This is an early and a valuable grass.

Alopecurus geniculatus—***Floating Foxtail-grass.*** Flowers in July and August. Perennial. Grows in wet grounds and marshy places.

Anthoxanthum odoratum—***Sweet-scented Vernal-grass.*** Flowers in May and June. Perennial. Grows in woods, meadows, pastures, and alpine situations.

Avena flavescens—***Yellow Oat-grass.*** Flowers in July. Perennial. Grows in dry meadows and pastures.

Briza media—***Common Quaking-grass.*** Flowers in June. Perennial.

Grows in meadows and pastures, and dry gravelly situations. An elegant grass.

Cynosurus cristatus—Crested Dogs-tail-grass. Flowers in July. Perennial. Grows in dry old pastures, &c.

Dactylis glomerata—Rough Cocksfoot-grass. Flowers in July. Perennial. Grows in meadows, woods, &c. A valuable grass.

Elymus arenarius—Upright Sea Lyme-grass. Flowers in July. Perennial. Grows on the sandy sea-shores. The roots extend amongst the sand, and are valuable (along with *Arundo arenaria,* where that plant can be easily procured) for binding it, and preventing the encroachment of the sea.

Festuca duriuscula—Hard Fescue-grass. Flowers in June and July. Perennial. Grows in pastures and waste ground. This plant in general habit differs little from *Festuca ovina,* except being stouter and having broader leaves.

Festuca heterophylla—Various-leaved Fescue-grass. Perennial. Flowers in June and July. Considered as a variety of the *ovina.*

Festuca loliacea—Spiked Fescue-grass. Flowers in June and July. Perennial. Grows in moist pastures and meadows. This grass has been highly recommended, but it has a coarse broad reed-like foliage.

Festuca ovina—Sheep's Fescue-grass. Flowers in June and July. Perennial. Grows on dry elevated pastures. Leaves, small and needle-shaped; and the plant must be regarded more for ornament than use.

Festuca tenuifolia—Small-leaved Fescue-grass. Flowers in June and July. Perennial. Grows in dry pastures. The chief use of this grass as well as the *ovina, duriuscula,* and *heterophylla,* is for sowing in lawns and similar situations, on account of the smallness of their leaves.

Festuca pratensis—Meadow Fescue-grass. Flowers in June and July. Perennial. Grows in moist meadows and pastures. A valuable grass.

Festuca rubra—Creeping Fescue-grass. Flowers in July. Perennial. Grows in mountain pastures, alpine places, and light sandy pastures near the sea. This grass is very nearly related to *Festuca duriuscula.*

Festuca sylvatica—Wood Fescue-grass. Flowers in July. Perennial. Grows in woods and hedges.

Lolium perenne—Perennial Rye-grass. Flowers in June and July. A well known cultivated grass. Grows naturally in pastures and meadows. There are numerous varieties of this grass, differing in bulk of herbage and permanency in the land. The more permanent varieties are known under the name *Perennial,* and the less permanent under that of *Annual;* even the least permanent will, under favourable circumstances, exist two or three years, while, in unfavourable circumstances, the most permanent will scarcely survive more than one year. The perennial varieties are also numerous, and known under various names,—those of Pacey and Pickney appear equal to any other.

The less permanent varieties, known under the name of annual, are all well adapted for a single crop of hay, on account of their yielding a greater bulk the first season. Whether there be any one variety of this class

more suited to cultivation than the rest, has not yet been ascertained; This forms the subject of experiments now in progress. We do not here take into account the *Lolium arvense* or Common Annual Ryegrass of botanists, which is not in cultivation.

Lolium Italicum—Italian Ryegrass. Flowers in May and June. Perennial. This grass is of very recent introduction, but last year's experience confirms the high character previously given of it, as yielding a much earlier and more abundant herbage, and possessing a much quicker growth than any other kind. Experiments respecting it are in progress.

Phleum pratense—Common Cat's-tail grass; Timothy-grass. Flowers in June. Perennial. Grows in meadows and pastures. This is a superior pasture grass.

Poa annua—Annual Meadow-grass. Flowers all the spring and summer. Annual. Grows in meadows, pastures, road-sides, pavements, &c. This is a small annual grass, but a remarkably free grower.

Poa aquatica—Reed Meadow-grass. Flowers in July and August. Perennial. This is a sweet tall reed-like grass, growing by the sides of rivers, ponds, and ditches.

Poa fluitans—Floating Meadow-grass. Flowers in July and August. Perennial. Grows in ditches and stagnant waters; but it will also grow upon a moist cultivated soil.

Poa glauca—Glaucous Meadow-grass. Flowers in June and July. Perennial. This is regarded by some as a smaller and glaucous variety of *Poa nemoralis*, though its habit is quite distinct.

Poa nemoralis—Wood Meadow-grass. Flowers in June and July. Is very early in its herbage. Perennial. Grows in woods and thickets.

Poa pratensis—Smooth-stalked Meadow-grass. Flowers in June and July. Perennial. Grows in meadows and pastures. This is a somewhat superior pasture-grass. It has creeping roots, and is therefore improper for the alternate husbandry.

Poa trivialis—Rough-stalked Meadow-grass. Flowers in June and July. Perennial. Grows in moist meadows and pastures. This is a superior pasture grass.

Secale cereale—Common Rye. Flowers in June and July. Grows naturally in its native country, Crimea, on a light sandy soil.

CLOVERS AND OTHER PLANTS.

Achillæa Millefolium—Common Yarrow or Milfoil. Flowers all summer. Perennial. Grows in pastures and waysides. Highly astringent.

Apium petroselinum—Common Parsly. Flowers in June. Biennial. Grows in its native country, Sardinia, on the sides of brooks.

Cichorium Intybus—Chiccory. Flowers in July and August. Perennial. Grows in waste places, &c.

Hedysarum Onobrychis—Common Sainfoin. Flowers in June and July. Perennial. Grows on dry chalky-hills and open downs.

Medicago lupulina—Black Medick or Nonsuch. Flowers from May to

August. Annual. Grows in waste and cultivated ground. The yellow clover of farmers.

Plantago lanceolata—Ribgrass, Ribwort Plantain. Flowers in June and July. Perennial. Grows in meadows and pastures. This plant has been long sown along with grass-seeds in small quantities, though it scarcely seems possessed of advantages for that purpose.

Poterium Sanguisorba—Burnet. Flowers in July. Perennial. Grows in dry, and frequently chalky, pastures.

Trifolium minus vel filiforme—Lesser Yellow Trefoil. Flowers in June and July. Annual. Grows on dry pastures, &c. In cultivation, but is a small inferior clover.

Trifolium pratense—Common Purple Trefoil. Flowers in summer. The wild plant is perennial; but the cultivated one is, in many soils, only biennial. There is a more permanent variety of it called *Cowgrass.*

Trifolium procumbens—Hop Trefoil. Flowers in June and July. Annual. This is an inferior clover, though somewhat in cultivation as a *yellow clover.*

Trifolium repens—White Trefoil or Dutch Clover. Flowers during summer. Perennial. Grows in meadows and pastures. A valuable clover, somewhat procumbent in its habit of growth.

Besides these, it may be proper to add certain other valuable herbage plants, which are not included in the tables, because their seeds are not yet articles of commerce, but which may be advantageously introduced into cultivation so soon as their seeds can be obtained.

Lotus major—Greater Birdsfoot Trefoil. Flowers in July and August. Perennial. Grows on sides of ditches and moist bushy places.

Vicia cracca—Tufted Vetch. Flowers in July and August. Perennial. Grows in hedges and bushy places.

Vicia sepium—Bush Vetch. Flowers in June and July. Perennial. Grows in woods and shady places.

Vicia sylvatica—Wood Vetch. Flowers in July and August. Perennial. Grows in bushy places.

Lathyrus pratensis—Meadow Vetchling. Flowers in July and August. Perennial. Grows in moist meadows and pastures.

Trifolium medium—Zigzag Trefoil. Flowers in July. Perennial. Grows in pastures and banks of earth, &c.

It has been a very general practice to sow most of the grasses by measure, and the clovers by weight. But though it may appear to some a serious innovation upon the old-established practice, it would certainly be more correct to sow the whole *by weight.* For, although in grass seeds the greater weight of one variety is no criterion of its superiority over another variety of less weight, yet a greater weight in the same variety always de-

:s a superior quality. Thus when seed is light, and consentlly inferior, the greatest number of seeds is obtained by adng to a given weight, and hence there is the chance of nearly :qual number of plants springing up as when the seeds are np and heavy.

lut a given weight or measure of seeds does not indicate the tive number of plants that will spring up, because there is ı a difference in the relative bulk and specific gravity of ls, and there is also a difference in the number of seeds that ʏ from a given quantity.

'hese circumstances, therefore, have been kept in view in :ing up the tables, and it has been deemed useful, for the pose of comparison, to give a table of the average weight of ıshel of each seed used.

ght of the Seeds of Grasses and other Plants, per imperial bushel.

ıstis stolonifera,	13 lb.	Festuca pratensis,	12½ lb.
vulgaris,	12	rubra,	10
flexuosa,	6½	sylvatica,	10½
ecurus geniculatus,	6	Lolium perenne, the varieties	
pratensis,	5½	vary from	18 to 30
ıoxanthum odoratum,	6	italicum,	16½
ıa flavescens,	5	Phleum pratense,	44
a media,	10½	Poa annua,	14
ɔsurus cristatus,	26	aquatica,	13½
ylis glomerata,	11½	fluitans,	14½
nus arenarius,	9½	glauca,	7½
uca duriuscula,	9½	nemoralis,	13¾
heterophylla,	12½	pratensis,	13½
loliacea,	15	trivialis,	15½
ovina,	13½	Secale cereale,	62
tenuifolia,	13		

Clovers and other Plants.

llea Millefolium,	28½ lb.	Trifolium minus,	64½
ysarum Onobrychis,	26	pratense,	62
licago lupulina,	63¾	cow-grass,	62
tago lanceolata,	51½	procumbens,	64
rium Sanguisorba,	24½	repens,	65

Climate, altitude, and particular circumstances influencing the lity, produce marked differences on the vegetation of coun-s. But the sphere within which plants are cultivated in a gle country such as Britain, is comparatively limited; and the ture grasses have, it is conceived, a wider range of cultivation

than the cereal grains. Where land is under the plough, therefore, and can produce the cereal grains and other cultivated plants, the natural grasses will grow with vigour. In elevated moors, and similar situations, indeed, the case is different, but the tables embrace such situations.

The herbage is influenced by the different kinds of soils, and especially with relation to their states of dryness or wetness. Soils have, therefore, as a convenient arrangement, and adapted to practical purposes, been classed under three divisions,—light, medium, and heavy. The light embrace soils more or less of a sandy and gravelly nature; the heavy soils embrace clays and heavy loams, and the medium soils are to be regarded as an intermediate class between these two extremes;—a light wet soil with respect to the grasses suited to it, approaching towards the heavy soils, and a dry heavy soil approaching towards the light soils.

The tables contain the weight of seeds to be sown per Scotch acre, as being conceived to be more convenient for Scotland; for, although the new weights and measures have been now a considerable period by law established, yet the old measure for land is held to be more convenient for the farmers of Scotland than the imperial. The imperial or English measure is to the Scotch nearly as five to four, that is, four Scotch acres are equal to five imperial or English acres. Where, therefore, the imperial measure is in practice, the tables can be readily converted into that measure by deducting one-fifth part.

QUANTITY OF GRASS SEEDS PER SCOTCH ACRE.

1. *For Alternate Husbandry.*

	For one year's Hay.	For one year's Hay and one year's Pasture.	For one year's Hay and two years' Pasture.
	lb.	lb.	lb.
Annual Ryegrass, . . .	22	8	...
Perennial Ryegrass, . .	...	18	28
Phleum pratense, . . .	...	3	2
Trifolium pratense, . .	10	5	2
repens, . . .	2	5	6
cow-grass, . . .	..	..	2
Medicago lupulina, . . .	..	2	2
	34	38	42

In heavy soils from 2 to 4 lb. of Phleum pratense may be added for one year's grass.

2. *For Permanent Pasture.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Perennial Ryegrass, . .	15 lb.	30 lb.	15 lb.	30 lb.	15 lb.	30 lb.
Alopecurus pratensis, .	1½	3	2½	5	4	8
Dactylis glomerata, . .	6	10	4	7	3	5
Festuca pratensis, . .	3	5	3	5	3	5
Poa trivialis, . . .		..	2	4	4	8
pratensis, . . .	4	8	2	4	..	..
Phleum pratense, . .		..	2	3½	4	7
Trifolium repens, . .	6	10	6	10	6	10
pratense, . .	2	3	2	3	2	3
cow-grass, . .	2	3	2	3	2	3
Medicago lupulina, . .	2	3	2	3	2	3
	41½	75	42½	77½	45	82

3. *For Permanent Pasture in Ornamental Parks.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Perennial Ryegrass, . .	12 lb.	20 lb.	12 lb.	20 lb.	12 lb.	20 lb.
Alopecurus pratensis, .	1½	3	2½	5	3	6
Dactylis glomerata, . .	4	7	3	5	2	3½
Festuca pratensis, . .	3	5	3	5	3	5
duriuscula, . .	2	4	2	4	..	..
ovina, . . .	1	2	..	..	..	..
loliacea, . .	..	..	1	2	2	4
rubra, . . .	1	2	..	..	..	..
Poa pratensis, . . .	3	6	2	4	..	..
trivialis, . . .	..	..	2	4	3	6
Anthoxanthum odoratum, .	1	1½	1	1½	1	1½
Cynosurus cristatus, . .	1	1½	1	1½	1	1½
Phleum pratense, . .	1	2	2	3½	4	7
Avena flavescens, . .	0½	1	0½	1	0½	1
Trifolium repens, . .	7	11½	6	10	6	10
pratense, . .	2	3	2	3	..	..
cow-grass, . .	..	..	2	3	4	6
Medicago lupulina, . .	2	3	2	3	2	3
	42	72½	44	75½	43½	74½

In certain cases, there may be added to either of the above Tables—

Achillea Millefolium, in dry soils, ½lb.

Hedysarum Onobrychis, in dry calcareous soils, 12 lb.

Cichorium Intybus, in heavy soils, 2 lb.

Apium petroselinum in lands where sheep are subject to rot, 1 to 2 lb.

And if a crop of hay be taken the first year, add,

Lolium perenne (variety for single crops of hay) in light, medium, or heavy soils, with a crop 4 lb.; without a crop 7 lb.

Trifolium pratense, in light, medium, or heavy soils, with a c 2 lb.; without a crop 3 lb.

4. *For Lawns, Bowling-greens, &c. kept constantly under the scythe.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Pacey's Perennial Ryegrass,	12 lb.	20 lb.	12 lb.	20 lb.	12 lb.	20 lb.
Alopecurus pratensis, .	1	2	1	2	2	4
Anthoxanthum odoratum, .	1	1½	1	1½	1	1½
Cynosurus cristatus, . .	2	4	4	8	4	8
Festuca pratensis, . .	1	2	2	4	2	4
ovina, . . .	1	2	..	..	..	..
heterophylla, .	1	2	..	..	..	..
duriuscula, . .	2	4	2	4	..	..
tenuifolia, . .	1	2	..	..	..	..
rubra, . . .	1	2	2	4	2	4
Phleum pratense, . .	..	..	..	..	2	4
Poa pratensis, . . .	4	8	2	4	..	..
trivialis, . . .	..	..	2	4	4	8
glauca, . . .	1	2	..	..	..	..
nemoralis, . . .	2	4	2	4	4	8
Trifolium repens, . .	6	9	6	9	8	12
	36	64½	36	64½	41	73½

5. *For Grounds much shaded with Trees.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Perennial Ryegrass, . .	12 lb.	20 lb.	12 lb.	20 lb.	12 lb.	20 lb.
Dactylis glomerata, . .	10	18	10	18	10	18
Anthoxanthum odoratum, .	1	2	1	2	4	2
Cynosurus cristatus, . .	1	2	1	2	1	2
Aira flexuosa, . . .	1	2	1	2	..	..
Festuca rubra, . . .	4	4	2	8	2	4
sylvatica, . .	1	1½	2	3	4	6
Poa pratensis, . . .	2	2	1	4	..	..
trivialis, . . .	..	2	1	..	2	4
glauca, . . .	1	..	..	2	..	..
nemoralis, . . .	2	6	3	4	4	8
Phleum pratense, . .	2	4	4	4	6	12
Trifolium repens, . .	6	9	6	9	6	9
	43	72½	44	84	48	85

6. *For Heathy and Moory Lands which have been Pared and Burned, or Scarified, for the purpose of producing herbage.*

These will rarely afford any thing more than a very cheap mixture of seeds, and the following are adapted for such situations:—

	With a Crop.	Without a Crop.
Mixed hay seeds, . . .	25 lb.	40 lb.
Rye (Secale cereale), . . .	...	45
Trifolium repens, . . .	6	9
	31 lb.	91 lb.

Where the land of this description is of a high altitude, as 500 feet and upwards above the level of the sea, the following, being particularly adapted for mountain pastures, may be added as a portion of the hay seeds,—

Festuca ovina,	2 lb.
duriuscula,	2
heterophylla,	2
Poa glauca,	2
	8 lb.

7. *For Improved deep Mossy grounds intended to lie in grass.*

	With a Crop.	Without a Crop.
Perennial Ryegrass,	10 lb.	18 lb.
Phleum pratense,	8	12
Trifolium repens,	8	12
Agrostis stolonifera,	2	3
Alopecurus pratensis,	2	3
	30 lb.	48 lb.

8. *For Land in Preparation for Irrigation.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.
	lb.	lb.	lb.	lb.	lb.	lb.
Perennial Ryegrass,	10	18	7	12	7	12
Agrostis stolonifera,	2	4	2	4	3	6
Alopecurus pratensis,	2	4	3	6	4	8
Festuca pratensis,	2	4	2	4	2	4
loliacea,	4	7	4	7	4	7
Poa trivalis,	2	4	2	4	3	6
fluitans,	1	2	2	4	2	4
Phleum pratense,	4	6	6	9	7	10
	27	49	28	50	32	57

9. *For Lands which are occasionally subject to the overflowings of lakes and rivers, or which, from other causes, are always in a very wet state.*

Poa aquatica,	6 lb.
fluitans,	6
Festuca loliacea,	4
Phelum pratense,	6
Alopecurus geniculatus,	6
Agrostis stolonifera,	4
	32 lb.

10. *For Warrens or Light Sandy Links.*

Perennial Ryegrass,	14 lb.
Anthoxanthum odoratum,	1
Festuca duriuscula,	1
ovina,	1
rubra,	1
Cynosurus cristatus,	2
Poterium Sanguisorba,	4
Achillea Millefolium,	0½
Trifolium repens,	6
——— minus vel procumbens,	2
Medicago lupulina,	2
	34½ lb.

If this mixture be sown without a crop, 1½ bushel of rye may be sown along with it.

11. *For Drifting Sands, which may be consolidated and have a sward produced upon them by sowing,*

Elymus arenarius, . . . 10 lb.

which should be mixed with clay and straw ropes cut into pieces and dibbled into the sand. After a sward has been produced, the mixture recommended for Warrens or Light Sandy Links may then be sown.

12. *For Dry Gravelly Situations, which resist a sward from all ordinary means. They may be sown with*

Agrostis vulgaris,	2 lb.
Poa annua,	4
Briza media	4
Aira flexuosa,	1
Trifolium minus vel procumbens,	6
	17 lb.

These tables, embracing the principal classes of cases for sowing land, might have been extended so as to suit numerous other circumstances which must frequently present themselves. But the general principles laid down have been deemed sufficient for the extent to which this paper was necessarily circumscribed, and because judgment and discrimination must, in many cases, be exercised, both regarding the kinds and the quantities of the seeds to be sown. Thus it may be expedient, in particular cases, to withdraw certain grasses and to substitute others; and this is especially to be kept in view where lands have a tendency to produce, naturally, any particular grass, which, though good in small quantity, is, in itself, but secondary with reference to the special object in view.

GARDENS OF WOBURN ABBEY.

Hortus Woburnensis, or a Descriptive Catalogue of upwards of 6000 *Ornamental Plants cultivated at Woburn Abbey; with illustrative Plans for the erection of Forcing-houses, &c. and an account of their management.* By JAMES FORBES, Gardener to his Grace the Duke of Bedford. Ridgway, 1833; 1 vol. 8vo.

TAKEN altogether, this is a very respectable publication, and is calculated to make us form a high estimate of the collection of plants at Woburn Abbey, and of the general management of the various gardens at that princely seat.

The descriptive catalogue of *plants* occupies more than one half of the volume; a space, we think, disproportionately large, because this catalogue, we are convinced, will not be found so useful as the author seems to anticipate, and because it has led him to be more brief in characterizing the *fruits* than we could have wished. The peculiarity of Mr Forbes's catalogue consists in its exhibiting the *generic* and *specific* characters at one glance, along with the scientific and English names, colour of flower, native country, and mode of culture. The generic and specific characters are, the author says, "much compressed." Our fear is, that they are so much compressed, that an unpractised cultivator of botany will derive little aid from them, while to a real botanist they must be altogether unsatisfactory. The compression consists in abbreviating the botanical terms in the most extraordinary manner. Take an example, which we give at random, and without selecting it as any way remarkable for obscurity: the specific character of Dracocephalum altaiense is thus set forth: "cord. obl. obt. den. up. camp." Without a glossary this would be altogether unintelligible. There is, however, an ample glossary, embracing the explanation of above *three hundred* abbreviations; a number which it would certainly be no easy matter to commit to memory. To the botanical cultivator who desires in an English dress full and accurate generic and specific characters of all known plants, already introduced, or likely to be introduced, in a living state, to this country, we may take this opportunity of recommending the new edition of the Gardener's Dictionary, by Mr George Don, as calculated to afford every satisfaction.

We must be excused for objecting to Mr Forbes's classing

varieties as on a par with *species*, as he does in the genus Pelargonium, where we find P. Obrienianum, Southcoteanum, Huseyanum, Vestrisianum, &c. These are mere garden *varieties*, which have been dedicated by good-natured gardeners and nurserymen to ladies of these respective surnames. We may remark, too, that all the 6000 plants in Mr Forbes's list scarcely deserve to be called "ornamental." Many of them indeed have no claim whatever to that epithet, although it appears in the title-page. Who, for example, would expect to find the common dock, Rumex obtusifolius,—the common thistle, Cnicus lanceolatus,—and even the common sow-thistle, Sonchus oleraceus, enumerated in a catalogue of "ornamental plants!" They are weeds in a plebeian garden, whatever rank they may hold in the ducal gardens of Woburn. Let it not be concluded, however, that we underrate the collection there: on the contrary, we are persuaded that it is extremely rich; and we are well aware that the Heathery and the Salicetum have long been celebrated.

The second part of Mr Forbes's work we regard as being by much the most important. In this part he begins with describing the fine pleasure-grounds, and he then details the management of the flower-gardens, parterres, conservatory, and plant-stove. He next presents us with lists of the numerous varieties of *fruits* cultivated at Woburn; but he merely characterizes them generally as *dessert* or *culinary*, without detailing their characters. This brevity we regret, for it would have been desirable to have had the opinion of a gardener of Mr Forbes's experience regarding the qualities of many of them. The general narrative of his management of the forcing department, being founded on extensive practice, must be valuable to all gardeners and amateur cultivators of exotic fruits. His account of the culture of winter cucumbers against a trellis in the pine-stove, seems particularly interesting. He gives distinct ground-plans of forcing-houses and pits, which must be instructive to those who may engage in erecting similar structures. He disapproves of the *hot-water* hot-wall, frankly acknowledging that it has failed in his hands. We believe the common *flued* wall, judiciously managed, to be far superior, and may instance the hot-wall at Erskine House (Lord Blantyre's), where Black Hamburgh Grapes are nearly produced in abundance and perfection, the bunches being large and the berries well swelled

ON THE RAISING OF WHEAT ON INFERIOR SOILS.

(To the Editor of the Quarterly Journal of Agriculture.)

It was with great regret that I observed in the evidence given before the Committee of the House of Commons on the state of agriculture, that there is now not a sufficiency of corn grown in the United Kingdom for the consumption of its inhabitants; and with still greater regret, that this deficiency arises not only from a deterioration in the fertility of the land in cultivation, but also from part of the inferior land having been thrown out of cultivation altogether. From my own observation, I should be inclined to confine the deficiency regretted to England. There has no land been thrown out of cultivation in Scotland; and though the produce of the greatest quantity of land which bore the highest rent during the war, may be lessened on account of a stricter economy in its management, yet I feel confident, that the inferior soils produce more than they did, by being retained in cultivation, and manured during the fattening of sheep. In Ireland there is an evident annual increase of all kinds of grain; and the gradual improvement in their quality, evince more and more the vast importance of the Irish supplies. The evidence also states that wheat is now raised in England in preference to the other species of corn, and that every advantage is taken of the land to cause it to grow wheat. This statement is evidently made by the witnesses to shew the needy condition of the farmers of England. Farmers find they cannot pay the expenses incidental to the cultivation of the soil, unless they grow wheat. The practice is strongly indicative of pecuniary difficulties, if the wheat is in any case taken as a "*catch crop*," that is, if they cause wheat to grow on land which has not been prepared and manured for the purpose. Wheat may be raised in any part of the rotation which admits a corn crop, provided the land is suitably prepared to receive it.

I have been induced thus to notice the statements in the evidence before the Committee, in order to show you that wheat may be raised in any part of the rotation, without deteriorating

the fertility of the soil. The low price of wheat induces the day labourers in Scotland to eat wheaten for oaten bread; and as it may be bought ready for consumption, it is consumed without the intervening expense of fuel to the labourer. There is, therefore, a greater demand for wheat, and less for oats, than there was. The adoption of railway communication through the country, will thin the ranks of horses, and their depopulation will naturally lessen the demand for oats; and more ground will thus be left to be occupied by wheat. Oats invariably following grass, they are often sown on soils quite unsuitable to them, but which with proper management are quite suitable for wheat. Thin clay soil however well drained and manured, is unsuitable to the growth of a heavy crop of oats. Thin soil of any kind on a retentive subsoil, never can grow good oats. But good wheat may be raised on both in the following manner.

Let a part of the lea ground intended to be broken up for oats in the following spring, be eaten close down with the whole stock by the end of July or early in August. In August, let it receive a rather shallow furrow. While the land is quite fresh after the plough, let the furrow slices be well torn to pieces by repeated harrowings. If the weather is dry and sunny at this time, the grass clods harrowed to the surface will soon wither. After they are withered, let the land receive a good cross-furrow with the plough. Harrow the land smooth, and set off the feering of the ridges on the old ridges. Manure the land with as much dung as there is to spare. Plough the dung down with a neat clean seed-furrow. Let the land settle down to a consistency till about seed-time; then sow off with winter wheat. This process is called "*rag fallowing*;" in England, believe, it is called the "*bastard fallow.*"

On less heavy soils, the presser may perhaps be advantageously employed when ploughing up the lea. The seed-furrow only being requisite with the presser, the lea can accommodate the live-stock till the seed furrow is about to be ploughed. I have never seen the operation of the presser, and therefore cannot recommend it by my own practice; but from the favourable account given of it by my friend Mr Hugh Watson, Kiellor farm,

in the last Number of the Journal, I have no doubt it is a useful implement, and will be the more appreciated the more it is known. Some dung can easily be spared on farms on which turnips are raised with bone-dust.

I take turnips after the lea wheat. The land is well worked, and the turnips are raised with one quarter of bone-dust per imperial acre, mixed with a considerable quantity of finely riddled coal ashes. The half of the crop of turnips is eaten off the ground with sheep. Barley follows the turnips, and grass-seeds are sown along with it. The grass is always good; and by this practice the land, when laid down to grass, is in excellent heart. The advantage to me is, that I receive a good crop of wheat, of as many bushels per acre as I used to reap from the same land a bad crop of oats. In the neighbourhood of towns, near the command of dung, this system might be practised in a four-course shift. And if by it a crop of wheat can be substituted for one of oats, the difference in the value of the two grains will assist to liquidate expenses, and most likely afford a profit where no profit existed before. Since the farmers in England find that wheat will repay their trouble better than any other kind of grain, it will certainly repay them the more the higher the state of fertility is in which the land is maintained; and they may rest assured, that the practice described above, will maintain the fertility of land, while it affords the kind of crop which they desire to raise; whereas the wretched system of raising wheat upon land unprepared for its reception, will only disappoint their own expectations, and entail on the nation the serious calamity of depending on foreign countries for a large portion of its means of subsistence.

G. B.

MISCELLANEOUS NOTICES.

I. *Prices of Wheat in England.*

In the reign of Philip and Mary,		£0	6	8	per quarter.
.....	Elizabeth,	0	9	0	
.....	James the First,	0	11	6	
.....	Charles the First,	0	14	0	
.....	Charles the Second,	1	0	0	
.....	James the Second,	1	4	0	
.....	William and Mary,	1	11	0	
.....	Anne,	1	13	0	
.....	George the First,	1	19	0	
.....	George the Second, £1 16 0 to	3	17	0	

And in George the Third's reign, in 1799, Mr James Bonar, then a carrier, paid, at Newcastle, for the use of the Jedburgh bakers, for the best flour 6s. 6d. per stone, and 8d. for carriage, which made a stone of flour of more value than a quarter of wheat in the reign of Philip and Mary.

II. *Malt Duty.*

ENGLAND.—For the year ending October 10. 1832, 4,122,590$\frac{4}{8}$ qrs. of Malt, at 20s. 8d. per qr. duty, ... L. 4,260,010 3 8

SCOTLAND.—For the year ending October 10. 1832,

370,530 qrs. of Malt from Barley, at 20s. 8d. per qr.,		L. 382,881	0	0	
93,623$\frac{4}{8}$ qrs. of Malt from Bigg, at 16s. per qr.		74,899	6	0	
464,153$\frac{4}{8}$					557,780 6 0

IRELAND.—For the year ending October 10. 1832,

221,804$\frac{4}{8}$ qrs. of Malt from Barley, at 20s. 8d. per qr.,		L. 228,680	16	7	
37,779$\frac{4}{8}$ qrs. of Malt from Bigg, at 16s. per qr.,		30,223	6	0	
259,084					258,904 2 7

THE UNITED KINGDOM.—For the year ending October 10. 1832, 4,845,828 qrs. of Malt, the duty on which amounts to . . L. 4,976,694 19 9

Malt used in distillation for the United Kingdom from October 10. 1831 to October 10. 1832.—

England, . . .	22,561 quarters.
Scotland .	328,329
Ireland .	89,866
Total,	440,756

Condensed from the Universal Corn Reporter.

III. *Hops.*—The growth and consumption of hops being a subject of some interest to the public, the following statement of the amount of old duty paid in hops in each year for the last sixteen years, from 1817 to 1832, both years inclusive, is submitted to their notice, dividing the sixteen years into

four parts, in order to show more plainly the gross and average amount of each of the four years:—

Years.		Years.	
1817, .	L. 66,522 2 5½	1825, .	L. 24,317 0 11½
1818, .	199,465 13 6½	1826, .	269,331 0 9½
1819, .	242,076 2 2	1827, .	140,848 6 2¾
1820, .	138,330 9 6½	1828, .	172,027 10 11½
Total,	L. 646,394 7 8½	Total,	L. 606,523 18 11½
Average,	L. 161,598 11 11	Average,	L. 151,630 19 8¾
1821, .	L. 154,609 10 3½	1829, .	L. 38,398 10 7¾
1822, .	203,724 14 9½	1830, .	88,047 8 1½
1823, .	26,057 11 9½	1831, .	174,880 1 2
1824, .	148,832 0 0½	1832, .	139,018 4 3½
Total,	L. 533,223 17 3¾	Total,	L. 440,344 4 2¾
Average,	L. 133,305 19 3¾	Average,	L. 110,086 1 0½

Number of acres under cultivation in hops in England in 1832, 47,101.

Universal Corn Reporter.

IV. *West Indies.*—The following statement of the population, produce, and imports and exports of the British West Indies, is compiled from official documents:—

Islands.	Whites.	Coloured. (Free.)	Slaves.	Sugar.	Coffee.	Rum.	Value of Exports to Great Britain.	Value of Imports from Great Britain.	Tonnage employed.
				Cwt.	lb.	Gallons.	£	£	Tons.
Antigua . . .	2,000	3,000	30,000	169,000	. . . .	160,000	270,000	115,000	9,800
Bahamas . .	4,200	3,000	9,300	. . . .	82,500	. . . .	21,000	59,000	1,400
Barbadoes .	15,000	5,100	82,000	322,000	. . . .	27,000	542,000	380,000	17,200
Berbice . . .	550	1,150	21,300	122,000	1,585,000	220,000	371,000	74,000	7,800
Bermuda . .	3,900	700	4,600	. . . .	. . . .	. . . .	4,000	60,000	800
Demerara . .	3,400	6,400	70,000	737,000	1,940,000	2,320,000	1,627,000	450,000	55,000
Dominica . .	850	3,600	15,400	56,000	613,000	63,000	150,000	16,000	3,000
Grenada . . .	800	2,800	24,000	186,000	6,000	330,000	338,000	72,000	12,000
Honduras . .	250	2,300	2,100	. . . .	. . . .	. . . .	222,000	572,000	11,200
Jamaica . . .	37,000	55,000	323,000	1,396,000	15,460,000	3,506,000	3,653,000	1,800,000	86,000
Montserrat .	330	800	6,200	26,000	. . . .	41,000	33,000	8,000	1,300
Nevis	700	2,000	6,600	50,000	. . . .	150,000	80,000	14,000	2,000
St Kitt's . .	1,600	3,000	19,200	102,000	. . . .	257,000	203,000	70,000	6,200
St Lucia . .	930	3,700	13,600	50,000	83,000	12,000	149,000	32,000	5,300
St Vincent's	1,300	2,800	23,500	222,000	. . . .	160,000	395,000	82,000	14,000
Tobago . . .	320	1,200	12,508	121,000	. . . .	500,000	165,000	41,000	6,600
Tortola . . .	480	1,300	5,400	16,000	. . . .	. . . .	25,000	3,000	1,300
Trinidad . .	4,200	16,000	24,000	241,000	. . . .	62,000	355,000	200,000	22,200
Totals. . .	77,460	113,890	692,700	3,816,000	19,769,500	7,808,000	8,603,000	1,035,000	263,700

V. *Value of the West India Colonies.*—We have been at some pains to investigate the affairs of our West India possessions, and have carried back our inquiries to the close of the American war, a period of exactly fifty years. What the West Indies have done for us within that period—as nearly as it has been possible to arrive at the truth, and we believe there is not the least exaggeration in any part of the statement—is as follows:—

During the last fifty years our imports from the West Indies (including the Mauritius) amounted to . . . . . L. 320,000,000

The duties paid on them to 270,000,000

Our exports to 190,000,000

The expenditure of the surplus income in this country, by the proprietors, has been . . . . . L. 160,000,000

The value of the Colonies, in Land, Buildings, and Negroes, is about 140,000,000

The Shipping engaged is of the first class of vessels, consisting of 950 ships, measuring 240,000 tons, and navigated by about 20,000 seamen. The population of the Colonies is composed of white inhabitants, about 80,000

Free persons of colour, about 45,000

Negroes, about 800,000

Persons supported at home by the manufactures and produce exported, and by the Import Trade, about 500,000

Liverpool Standard.

IV. *Statistics of Brewing in England and Scotland.*—There were 216 brewers in Scotland last year, of which above 33 are in the Edinburgh collection. Argyll has only 1. There are 17,070 licensed victuallers in Scotland, which is 1 for every 123 persons, young and old, in the country; and though grocers who sell beer are evidently included with innkeepers, the proportion is still very great. England, which is a *thirsty* country, rejoices in 50,800 victuallers, and 30,000 "persons licensed for the general sale of beer," making an aggregate of 81,700 retailers of beer, which is 1 for every 170 souls. England has 1753 brewers, of whom 108 are in London. Of the retailers of beer, 37,000, or nearly one-half, brew their own beer. In Scotland, only 318 out of 17,070, or 1 in 57, brew their own beer. In Scotland, 990,000 bushels of malt were used for brewing in all the 16 collections, of which *one-tenth* was used by the licensed victuallers; 432,000 bushels were used in the Edinburgh collection; 62 bushels served the two collections of North and South Argyll, containing 100,000 souls. In England, 25,800,000 bushels of malt were consumed in the manufacture of beer, 13,800,000 by the brewers, and 12,000,000 by the victuallers or other retailers. In Scotland, the malt brewed is at the rate of four-tenths of a bushel for each person; in England, it is 1¾ bushel. Ireland consumed 1,540,000 bushels of malt in her breweries, which is about two-tenths of a bushel for each person. Of brewed liquor, *one* Englishman drinks as much as *four* Scotchmen, or *nine* Irishmen. In 1831, there were 928,000 bushels of malt used for brewing in Scotland, of which 834,000 were used by the brewers, the rest by victuallers. In 1830, the Scotch brewers consumed 740,000, but the paper from which this is taken does not mention the victuallers. The increase in the quantity of malt used by the brewers since 1830 seems to be about *one-fifth*.

VII. *Emigrants to Canada.*—Comparative statement of the number of emigrants [illegible] at Quebec during the last four years:—

	1829.	1830.	1831.	1832.
England,	3,544	6,799	15,313	17,481
Ireland	9,634	18,300	34,133	28,204
Scotland	2,643	2,450	5,354	5,500
Hamburgh and Gibraltar,	. .	. .	. .	9
Demerara,	. .	. .	. .	6
Nova Scotia, New Brunswick, and Newfoundland,	124	451	424	547
	15,945	27,990	55,224	51,746

VIII. *Committals in England and Wales.*—Table shewing the increased number of committals for trial, since the deduction on the duties of beer and spirits, in the course of the last ten years:—

Committed in England and Wales, in	1823,	12,263
	1824,	13,698
	1825,	14,437
Duty on spirits lowered,	1826,	16,164
	1827,	17,924
	1828,	16,564
	1829,	18,675
Beer duty repealed,	1830,	18,107
	1831,	19,646
	1832,	20,829

Parliamentary Paper, 29th March 1833.

IX. *Consumption of Silk.*—The quantity of this material used in England alone, amounts each year to more than four millions of pounds weight, for the production of which, myriads upon myriads of insects are required. Fourteen thousand millions of animated creatures annually live and die to supply this corner of the world, with this luxury! If astonishment be ascribed at this act, let us extend our view to China, and survey the dense population of its widely spread region, whose inhabitants, from the emperor on the throne to the peasant in the lowly hut, are indebted for their clothing to the labours of the silk-worm. The imagination fatigued with the flight, is lost and bewildered in contemplating the countless numbers, which every successive year spin their slender threads for the service of man.—*Repertory of Patent Inventions. No.* 95.

X. *The Lantern.*—It is perhaps not generally known that we are indebted to Alfred the Great for the invention of that useful article, the lantern. In the life of Alfred, by Asserius, we have the following account: "Before the invention of clocks, Alfred caused six tapers to be made for his daily use, each taper contained twelve penny-weights of wax, was twelve inches long, and of proportionate breadth; the whole length was divided into twelve parts or inches, of which three would burn for one hour, so that each taper would be consumed in four hours, and the six tapers, being lighted one after another, lasted for twenty-four hours. But the wind, blowing through the doors and windows, and chinks of the walls of the chapel, or through the cloth of his tent, in which they were burning, wasted these tapers, and consequently they burned with no regularity; he therefore designed a lantern made of ox and cow horn, cut into thin plates, in which he enclosed the tapers, and thus protecting them from the wind, the period of their burning became a matter of comparative certainty."

XI. *New Tail-piece for the Violoncello.*—By this invention the vibrations are much facilitated, and the tones rendered far more equable than hitherto. Another advantage of this invention is, that, in most cases, it will relieve the defective notes E and F, commonly called by manufacturers and players of violoncellos, "the wolf." This advantage is gained by tuning behind the bridge; for should one of the strings in the short space between the bridge and tail-piece, be either of the before-named notes, or within a semi-tone of either of them, they will be found to be much harsher when the finger is placed upon the finger-board, than if tuned to any other note in the octave.

As the bridges of musical instruments are not cut to a certain curve, this invention being divided into four distinct parts, forms itself to the same curve, and thereby relieves the bridge of a weight, with which the strings are oppressed, by the reverse direction of the strings in the old tail-piece. The tail-piece of the violoncello is a thin board, usually of ebony, fixed at the end of the instrument opposite to the pegs, and to which the ends of the strings are tied or otherwise fastened. This invention consists, *first*, in making three longitudinal cuts in the tail-piece, dividing it into four bars, united only at the extreme end, and sufficiently separated at the other to prevent them from touching while in a state of vibration, and attaching the strings, one to each of the bars. In each bar are three holes, and the string is to be fastened to whichever of them, on trial, shall be found to give the most perfect tone. *Secondly*, The material of the tail-piece, instead of being wood as usual, is of soft hammered brass; this alloy being found to give freer vibrations than copper, and to be preferable to iron or steel, on account of the metallic quality of tone which attends the use of these substances. By the above arrangement, each string being attached to its own bar, the string and bar form a continuous and distinct line, and, therefore, the vibrations of the different notes interfere less with each other. When the strings are tied to one common tail-piece, the breaking of one puts all the others out of tune; but in this invention, as each string has its own bar or tail-piece, the breaking of one affects the other in a very slight degree.—*Invented by Mr S. A. Foster, and described in the Transactions of the Society of Arts.*

XII. *On the Savage State of Man.*—A recent author observes, that "the New Zealanders seem to have been in quite as an advanced state when Tasman discovered the country in 1642, as they were when Cook visited it one hundred and twenty-seven years after." It may be remarked, with reference to the absence of written records among savages, that it is, though a very important, rather a secondary than a primary obstacle to civilization. It is one branch of that general characteristic of the savage, *improvidence*. If we suppose the case of a savage taught to read and write, but allowed to remain, in all other respects, the same careless, thoughtless kind of being, and afterwards left to himself, he would most likely forget his acquisition, and would, by neglecting to teach it to his children, suffer it to be lost in the next generation. On the other hand, if we conceive such a case (which certainly is conceivable, and is probably a real one,) as that of a people ignorant of this art, but acquiring in some degree a thoughtful and provident character: there is little doubt, that their desire, thence arising, to record permanently their laws, practical maxims, and discoveries, would gradually lead them first to the use of memorial verses, and afterwards to some kind of material symbols, such as picture writing, and then hieroglyphics; which might gradually be still farther improved into writing, properly so called.

There are several circumstances which have conduced to keep out of sight one important fact just alluded to. The chief of these probably is the vagueness with which the term *savage* is applied. It is evidently not possible to draw a line, by which we may determine precisely to whom that title is, and is not, applicable; as there is a series of almost insensible degrees between the highest and the lowest state of human society. Nor is any such

exact line needed for our present purpose. It is enough if we admit that those who are in as *low a state as some tribes with which we are acquainted* are unable to raise themselves from it by their own unaided efforts. But many, perhaps, are misled by the language of the Greeks and Romans, who called all men barbarians except themselves. Many, perhaps all, other nations fell short of *them* in civilization; but several nations, even among the less civilized of the ancient barbarians, were very far above what we mean by the savage state, as is to be found among many tribes at this day. For instance, the ancient Germans were probably as much raised above that state, as we are above theirs. A people who cultivated corn, though their agriculture was in a rude state; who not only had numerous herds of cattle, but employed the labour of brutes, and even made use of cavalry in their wars, and who also were accustomed to the working of metals, though their supply of them was scanty,—these cannot properly be called savages. Or again, we are liable to be misled by vague descriptions of extensive districts, inhabited by distinct tribes of people, differing widely from each other in their degrees of cultivation. Some, for instance, are accustomed to speak of the ancient Britons in the mass; forgetting that, in all probability, some of these tribes were nearly as much behind others in civilization, as the children of the mist, described by Sir Walter Scott in the *Legend of Montrose*, if compared with the inhabitants of Edinburgh at the same period. And thus travellers may have represented some nations as in the condition of mere savages, from having viewed only some part of them, or visited one of their districts.

When due allowance is made for these and other causes of inaccuracy, there will be no reason, I think, for making an exception to the positions here laid down; namely, that it is impossible for men to rise unaided from a completely savage state (supposing mankind to have sprung from one common pair); they must have descended from ancestors less barbarous, and from whom they have degenerated. It is not likely that we should possess records of this degeneracy, but several indications of the fact may often be found among savage nations. Some have even traditions to that effect, and almost all possess some one or two arts not of a piece with their general rudeness, and which plainly appear to be remnants of a better state of things; being such that the first *invention* of them betokens a degree of ingenuity beyond what the savages who *retain* those arts now possess. It is interesting to look over the various accounts we possess of different savage tribes, with a view to this point. In the course of such an inquiry it will be found, that each savage tribe having retained such arts as are most essential to their subsistence in the particular country in which they are placed, there is accordingly, generally speaking, less of degeneracy in many points in the colder climates, because these will not admit of the same degree of that striking character of savages' *improvidence*. Negligence in providing clothing and habitations, and in laying up of stores of provisions, which, in warm and fertile countries, may yet be compatible with subsistence in a very rude state, would, in cold and inhospitable regions, destroy the whole race in the course of a winter.

As to the causes which have caused any portions of mankind thus to degenerate, we are, of course, in most instances left to mere conjecture; but

the principal cause has most probably been war. A people perpetually harassed by the incursions of an enemy, whose object is booty, and still more, are compelled to fly their country and take refuge in mountains and forests,* or to wander to some distant unoccupied region (a fact anciently of common occurrence) must of course be likely to sink in point of civilization. They must, amidst frequent and painful struggles for mere existence, have their attention drawn off from all other subjects; they must be deprived of the materials and the opportunities for practising many of the arts till the knowledge of them is lost; and their children must grow up, in each successive generation, more and more uninstructed, and disposed to be satisfied with a life approaching to that of the brutes. A melancholy picture of the operation of these causes is presented in the kingdom of Abyssinia, which seems to have been for a considerable time verging more and more from a state of comparative civilization towards barbarism, through the incessant hostile incursions of its Pagan neighbours, the Galla.—*Saturday Magazine, No. 77.*

XIII. *Misconceived Influences of the Moon.*—It is generally believed, especially in the neighbourhood of Paris, that the moon in certain months has a great influence on the phenomena of vegetation. They give the name of "red moon" to the moon which, beginning in April, becomes full either about the end of that month, or in the course of May. It is maintained that during these two months, when the sky is clear, the leaves and buds exposed to this light become red, that is to say, frozen, although the thermometer in the free atmosphere, should stand several degrees above the freezing point; and that if the rays of the moon be intercepted by clouds, and prevented from reaching the plants, the same effects do not take place, under circumstances perfectly similar in other respects with regard to temperature. No one had supposed before Dr Wells, that terrestrial substances, excepting in the case of very rapid evaporation, may acquire during the night a different temperature from that of the surrounding air. This important fact is now well ascertained. We cannot, therefore, judge of the degree of cold with which a plant is affected during the night by the indications of a thermometer suspended in a free atmosphere. The plant may be strongly frozen, although the air remains constantly several degrees above the freezing point. In the nights of April and May the temperature of the atmosphere is frequently only four, five, or six centigrade degrees above zero. When this happens, plants exposed to the light of the moon, that is to a *clear* sky, may be frozen, notwithstanding the indications of the thermometer. If the moon, on the contrary, does not shine, in short if the sky be cloudy, the temperature of the plants does not fall below that of the atmosphere, and they consequently will not be frozen, unless the thermometer indicates zero (the freezing point of Fahrenheit.) It is therefore quite true that a plant may be frozen or not, according as the moon is visible or concealed behind clouds. The moon's light is in this case only the index of a clear atmosphere, and it is in consequence of the clearness of the sky, that the nocturnal congelation of plants takes place; the moon contributes to the effect in no way whatever, for though she might be hid under the horizon, the effect would not be different.—*M. Arago, from the Field Naturalist's Magazine,* No. 8.

* Whence the name "Savage," *Selvaggio.*

XIV. *Fertilisation of old Lavas.*—Among the practical consequences that result from the facility with which Cacti strike from cuttings, there is one which deserves to be noticed, on account of its importance, viz. the manner in which the *Opuntia (European Indian Fig)* is employed to fertilize the old lavas at the foot of Mount Etna. As soon as a fissure is perceived, a branch or joint of an opuntia is stuck in, and the latter pushes out roots, which are nourished by the rain that collects around them, or by whatever dust or organic remains may have collected into a little soil. These roots once developed, insinuate themselves into the most minute crevices, expand, and finally break up the lava into fragments. Opuntias treated in this manner produce a great deal of fruit, which is sold as a refreshing food throughout all the towns of Sicily.—*Decandolle.*

XV. *On the Culture of the Garden Bean.*—I have been very successful for half-a-dozen years in obtaining two crops of beans from the same plants. In the summer of 1826, my first crop of mazagan and early long-pod beans was, by a very strong and violent wind, blown down; this was done when the beans were in full blossom. The crop from the blossoms which the plants then possessed was very fine and abundant, and gathered during July. In three weeks after the beans were prostrated, each stem pushed forth from near the root one or more, in some instances four to six fresh stems; these bloomed freely and produced an abundant crop, which was gathered during September. Since that grew, I have uniformly bent down, so as to break the stalk near the root, my first and second crops of beans; I have by this means obtained four crops of beans from two sowings, and which supplied me from July 1st to 31st October. By this method only half the seed was required which I had been accustomed to use, and the greatest advantage to me was that only half the ground was required, so that my advantages by this method are fourfold. I always pinch out the tops when the plants are in full bloom; this throws the vigour into the production of fruit instead of a continued increase of stem and foliage.—*Mr James Falkland, Pentonville, in the Gardener's and Forester's Record*, No. 3.

XVI. *To prevent the Sprouting of Store Onions during the Winter.*—Apply a heated iron for a few seconds to the nozzle of the onion whence the roots protruded, and it will be an effectual mode of preserving them.—*Gardener's Magazine.*

XVII. *Saving Peas and Beans from Mice.*—Chop up the tops of last year's shoots of furze, and sow them in the drill.—*Gardener's and Forester's Record*, No. 3.

XVIII. *On securing the Fruitfulness of Fruit-trees.*—There are few subjects in horticulture which can be more acceptable to your readers than a system by which good crops of fruit may be obtained from pear-trees against the east and west walls of gentlemen's gardens; the bad crops these trees have afforded, have been proverbial ever since I can remember; and the unnatural schemes which are now resorted to, such as strangulation, ringing, depressing of the branches, and reverse grafting, show that a good system of cultivation is not yet established. This failure has generally been imputed by gardeners to the climate; but as the trees are seldom without fruit at the extremity of the branches, the supposition may be considered erroneous.

It is about twenty years ago since I noticed a brown beurré pear-tree, trained against the east front of a farmer's cottage. This tree grew upon a limestone rock, where there was very little earth, yet it never failed to yield yearly plenty of large and well-flavoured fruit. From what I observed of this tree, it appeared evident that the rich and deep border, usually prepared by gardeners, was decidedly wrong, as the plants in this case generated too much sap, which always induces disease and barrenness; and I believe it will be found in the tree, as in the human constitution, that the state of the health consists in the medium between emptiness and repletion. Sir H. Davy has shown the utility of stones in agricultural crops; and I have found them accordingly beneficial in the formation of fruit tree borders; they prevent the accumulation of water in very wet weather, and also sustain sufficient moisture for the purposes of the plant in dry seasons. In 1813 I replanted an old pear wall 240 feet long, the border for these trees was 12 feet wide, and only 26 inches deep, 8 inches of which were filled with stones, such as could be most readily procured in the neighbourhood, and the remaining 18 with the mould which composed the old border. By this scanty supply of earth for the roots of these plants, I have succeeded in obtaining a fruitful and healthy growth, equally remote from debility and luxuriance; and by this simple process I procure fruit all over the tree, as regularly as if it had been mechanically placed, both plentifully up the main stem, and on the lowest horizontal branches. My trees are fan-trained in the best manner; the shoots are kept as uniform and straight as the plications of the instrument from whence the name is derived, and, when the fruit is full grown, exhibit one of the most interesting scenes to be met with within the confines of a garden.

With regard to pruning, the knife should be used as sparingly as possible; I conceive it to be as injurious to this tribe of fruit-trees, as the lancet is to the animal life; it creates those inconveniences which it is employed to remove; whoever indulges in its free use most certainly defeats his own purpose. Let any man who is inclined to dissent from this opinion, consider the common thorn confined in a hedge, where it annually undergoes the operation of clipping, and the shrub in its primitive growth, and he will want no argument to convince him of the impropriety of the practice. But my plants require very little assistance from the knife; they make no brushwood, the energies of the tree being chiefly engaged in forming blossom buds for the future crop.

It may be justly inferred from what is here stated, that the bad success which most gardeners have experienced in the cultivation of this valuable fruit, arises principally from the luxuriant state of these trees; the limited space which they occupy on the wall is so disproportionate to their natural growth, that it is almost impossible, with deep and highly manured borders, to reclaim them from a habit of plethoric sterility. The farina, and the whole fructification, partake of this unhealthy condition; and it may be observed, that fruits fecundated with bad pollen scarcely ever resist the atmospheric changes which they afterwards encounter. From observations made in vegetable physiology, I am persuaded that the tree is principally the produce of the earth, and the fruit of the atmosphere; a great diminution of vigour may take place in the one,

without any perceptible alteration in the other. It is, therefore, the first object of the cultivator, to proportion the supply of nutriment to the extent of the tree; and this will be best effected by the shallow borders above described.—*Mr Robert Hiver, in the Gardener's Magazine.*

XIX. *Golenos Oak.*—This large tree, which was felled in 1810, grew about four miles from the town of Newport, in Monmouthshire. The main trunk at 10 feet long, produced 450 feet; one limb 355, another 472, a third 235, a fourth 156, a fifth 106, a sixth 113, and six other limbs of inferior size, averaged 93 feet each, making the whole number 2426 cubic feet of sound and convertible timber. The bark was estimated at 6 tons; but as some of the heavy body-bark was stolen out of the barge at Newport, the exact weight is not known. Five men were twenty days stripping and cutting down this tree; and a pair of sawyers were five months converting it, without losing a day, Sundays excepted. The money paid for converting only, independently of the expense of carriage, was L. 82; and the whole produce of the tree, when brought to market, was within a trifle of L. 600. It was bought standing for L. 405. The main trunk was 9½ feet in diameter, and in sawing it through, a stone was discovered, six feet from the ground, above a yard in the body of the tree through which the saw cut; the stone was about six inches in diameter, and completely shut in, but round which there was not the least symptom of decay. The rings in its butt were carefully reckoned, and amounted to above 400 in number, a convincing proof that this tree was in an improving state for upwards of 400 years; and as the ends of some of its branches were decayed, and had dropped off, it is presumed it had stood a great number of years after it had attained maturity.—*Time's Telescope, vol. 3.*

XX. *On the Utility of Planting Ash.*—If plantations be made with a view to profit, which is the only view which I ought to suppose the planter to have, the trees ought to be planted at very little more, if any, than 4 feet apart in each direction. If intended for underwood, as the ash generally is, they may be planted still closer, and I have often thought, and still think, that a plantation of ash, the rows only 2 feet apart, and the plants not more than 12 or 14 inches apart in the row, would yield an enormous profit; if, in the first place, every other row were taken out, and every other plant in each of the remaining rows were taken out at the end of six or seven years; the poles would be fit for hoops. The rest of the trees might remain till they had a growth of ten years, by the end of which time, they would, if properly treated, and in a good soil, make hop-poles of 20 feet long; so that at the end of ten years from the day of planting, an acre of land would yield 43,060 hoops, and 14,520 hop-poles. The hop-poles would be worth on the spot, in any part of England, at the least value, L. 2 per 100; and in some parts double that sum. Such amount would make the acre of ground yield L. 290 in poles, in ten years. The price of the hoops on an average would not be less than L. 2 per thousand, which makes L. 87 more. The total amount of the produce of one acre is L. 377. The costs would consist of rent, taxes, fencing, cutting down, and trimming. The labour would be paid by the faggot-wood. The annual expense for fencing and cultivation, in the early stages of the plantation, would not exceed L. 4 or L. 5 per acre. In short, I think I can defy any man to show that all the costs upon the acre, at rows

two feet apart, and plants 12 inches apart in the row, would exceed L. 100, in the course of ten years, including every charge, and allowing the land to be worth L. 3 or L. 4 per acre. Here, then, in the first ten years, there would be gain, greater than can possibly be derived, in the ordinary way, in the course of four or five times ten years. But this is not all; for the poles once cut down, there would come up from the stems another crop, I admit not equal to the first, but probably three times as great as ever was yielded by a common plantation. If the plantation was in a part of the country where hop-poles were not wanted, the poles would be wanted for some other purposes; if left standing till they were twelve, fifteen, or sixteen years old, they would be fit for wheelwrights, and for many of the numerous uses that ash timber is applied to. If it is wished that this acre should become a plantation of ash-trees of lofty stature, it is only when the poles are cut, to leave one standing about every 10 square feet; and, if these should be found to be, in a few years time, too near to each other, it will be required, in proportion as they are in danger of becoming too crowded, to cut part of them out. Those remaining would subdue all the stems that were under them, but still there would be some underwood, which, though of an inferior description, would much more than pay all the expense of keeping the plantation pruned and fenced. In whatever way, however, the plantation be made, and with whatever view, the plants ought to be cut down nearly to the ground, the first year after they have been planted,—that is to say, if planted in the fall, or in the spring, they ought to be cut down the succeeding spring, and in the month of April. To make it plain: if planted in the spring of this year, they ought to be cut down in the month of April next year; and if planted in the last fall, they ought not to be cut down until the April but one after. In other words, they ought to have the growth of one summer before they be cut down. As fuel, the ash is far better than any other sort we have; its growth is almost the quickest; its various uses are all of importance, and its propagation, cultivation, and management, are all nearly as easy as those of a cabbage plant.—*Gardener and Forester's Record, No.* 4.

XXI. *To destroy Moles in Gardens.*—Collect earthworms, kill them, and mix them with the powder of *nux vomica*. After the mixture has remained in a heap for 24 hours, take the worms and place one or two here and there in the routes and holes of the moles. The desired effect is said to be the result.—*Bulletin Universel.*

XXII. *Water in Flour.*—Most important researches have recently been carried on in Paris by MM. Payen and Persoz, on the several points in the chemical history of bread, flour, and grain. Their observations are not yet published in detail; but we select the following as being one of the very highest commercial dietetic importance. They have found that 100 parts of flour, sold as dry, and imparting no moist stain to blotting paper, contain, under atmospheric circumstances, 19 per cent. of water, and but 89 of dry nutritive matter; that flour exposed to moist air contains as much as 23 per cent. of water; that the finest flour employed by the bakers contains 16 per cent. under ordinary circumstances. In summer these proportions are reversed, but they are remarkably increased in moist weather. Thus, the quan-

f flour which, by weight, at the rate of 5 per cent. of water, would pro-
150 lb. of bread, will produce but 127½ lb., when the same weight of
s purchased in long continued wet weather. The prices of flour should,
quently, in all seasons be based on the quantity of dry matter it con-
and which a simple and rapidly performed experiment would exactly
te. Thus by placing 100 grains of flour on a plate, and heating them on
el of boiling water for one hour, the loss sustained will denote the pre-
uantity of water mixed with the flour.—*Universal Corn Reporter.*

III. *Compression of Water.*—Mr Jacob Perkins has invented an apparatus,
, by hydrostatic pressure, compresses water to an extent equal to a four-
1 part of its volume. The force employed is equivalent to a pressure of
) lb. to the square inch, and is applicable to other fluids. In most of
orks on natural philosophy, water is treated as incompressible and non-
:; by this apparatus the opposite of these two propositions is clearly
. There was a considerable difficulty in getting a vessel capable of re-
g so high a pressure; and the chief feature of this instrument is, the
er of constructing the cylinder, which is formed of a series of concentric
: thus the inner or smaller tube is first formed by welding, and is turn-
urately on the outer surface; the next tube is then formed and is accu-
turned on the inner surface, and the bore of this second or outer tube
too small to receive the first tube, but, in order that it may do so, it is
d, till, by expansion, it is capable of receiving the first tube within it,
1 cooling the second tube shrinks on the first tube and strongly embraces
together; a third tube, a fourth, and so on, are similarly put on, till a
ler is produced capable of withstanding any pressure.—*Repertory of Pa-
nventions*, No. 104.

XIV. *Signs of Rain.*—The following lines were sent by Dr Jenner, the
erer of Vaccination, for not accepting the invitation of a friend to make
cursion with him.

The hollow winds begin to blow,
The clouds look black, the glass is low;
The soot falls down, the spaniels sleep,
And spiders from their cobwebs peep:
Last night the sun went pale to bed,
The moon in haloes hid her head;
The boding shepherd heaves a sigh,
For see a rainbow spans the sky:
The walls are damp, the ditches smell,
Closed is the pink-eyed pimpernel.
Hark how the chains and tables crack,
Old Betty's joints are on the rack:
Loud quack the ducks, the peacocks cry;
The distant hills are seeming nigh.
How restless are the snorting swine;
The busy flies disturb the kine;
Low o'er the grass the swallow wings;
The cricket too how sharp he sings;
Puss on the hearth, with velvet paws,
Sits wiping o'er her whiskered jaws;
Through the clear stream the fishes rise,
And nimbly catch the incautious flies,

The glow-worms, numerous and bright,
Illumed the dewy dell last night.
At dusk the squalid toad was seen,
Hopping and crawling o'er the green:
The whirling wind the dust obeys,
And in the rapid eddy plays;
The frog has changed his yellow vest,
And in a russet coat is dressed.
Though June, the air is cold and still,
The mellow blackbird's voice is shrill,
My dog, so altered in his taste,
Quits mutton-bones on grass to feast:
And see yon rooks, how odd their flight,
They imitate the gliding kite,
And seem precipitate to fall,
As if they felt the piercing ball,
'Twill surely rain, I see with sorrow;
Our jaunt must be put off to morrow.

XXV. *Preservation of Substances by means of Alkalis.*—M. Payen has preserved, during many months, polished instruments of iron and steel, by keeping them in solutions of potash and soda,—saturated solutions diluted with one, two, or three times their weight of water. He at first thought, that the preserving power depended upon the disappearance of the air, and the carbonic acid in the alkaline mixture, but he afterwards concluded, that, alkalinity acted an essential part in the phenomenon. In fact, a very small quantity of alkali is sufficient; thus, $\frac{1}{300}$ and even $\frac{1}{500}$ of caustic potash in water, will preserve from oxidation bars of iron, &c. immersed in it. Lime water, diluted with its own weight of water, or of course without dilution, answers the same purpose. Alkaline carbonates and borax have the same effect, but they must necessarily be stronger.—*Revue Encyclopedique.*

XXVI. *Greenhouse Plants.*—Greenhouse plants are such as are natives of the Canary Islands, New Holland, the Cape of Good Hope, and other countries in the same latitudes, which only require to be protected from the frosts of this country. They are therefore kept under glass during winter, but no fire is requisite, unless a strong frost is expected during the night. In winter they should have plenty of air during fine days, as early in the day as the weather will permit, and the house should be shut up very early in the afternoon, if the weather be cold. When the weather continues damp and wet, a little fire is requisite to expel the damp, for greenhouse plants are more likely to be injured by damp than cold. The plants should be looked over every day, to take off any dead leaves, and to water them that are dry. This operation should take place only in the forenoon, and if the surface of the earth in the pots becomes green, it should be removed with a flat stick, but not so deep as to injure the roots, when a little fresh earth should be laid upon them. Towards spring they require a more plentiful supply of air and water, and if no frost be apprehended, some of the sashes should be left a little open all night, so that the air may be gradually admitted as the weather advances towards summer, until the time of setting the plants out of doors. In some seasons this may be requisite about the middle of May, in others not until the end. Calm

cloudy weather is the best time for setting them out: the most sheltered situation should be chosen, a bed of ashes being previously prepared for them.

There are various opinions as to the best time of shifting greenhouse plants into fresh pots and mould; we think the earliest spring time should be preferred. Some shift them before they are set out of doors, others when they first set them out; some do this in the autumn, which of all times is the most improper; the pots should always be well drained with shreds. If any of the plants have grown too straggling or tall, they should be cut back early in the spring, that they may become good bushy plants before autumn. In summer while the plants are out of doors, they should be regularly supplied with water in dry weather, as late as possible in the afternoon. The mould for potting should never be sifted, but chopped up finely with the spade with the turf. This keeps the soil light and loose, it allows the roots of the plants to spread, and the water to penetrate; while, on the other hand, sifted mould hardens and becomes sour. Cuttings of greenhouse plants require putting in at various seasons. If they are to be ripened cuttings, they should be planted early in the spring; but if young, the time to plant them is when the shoots have grown a sufficient length for that purpose. In potting of plants raised from cuttings, care is requisite not to injure the fibres. Put them in small pots first, and increase the size as they grow; but be careful not to put them in too large, or to give too much water. Sow the seeds early in the spring, place in a little bottom heat, and pot the young plants separately when they have grown an inch high.—*Mr George Don, on Gardening and Botany.*

XXVII. *The Turnip-fly.* (*Altica.*)—The turnip-fly is not always of one kind, but the difference in them is not very important, for they only alter in their paint, their build is always alike. The most common is bottle-green, but in some fields are all painted black, with a white line on each side from stem to stern down the neck. They are so active, that the only way in which I could ever obtain them, in newly sown fields, was by sweeping the surface with a gauze net, on an iron hoop at the end of a strongish stick. They jump like fleas as soon as they see you. This insect, or rather its grub, commences its attack on the turnip as soon as it is up, devouring the two cotyledons and the little heart, and sometimes in a few days leaving the field as brown as it was on the day it was sown. Schemes without number have been tried to get rid of or kill this little pest wherever it has appeared. I have always observed the greatest quantity of grubs on very young plants; they are very various in size, and it is not before the plants are a fortnight or three weeks old, that the beetles appear in any quantities. Yet there are some beetles observed at the first coming up of the plants.

Now I know from experience, that the turnip-fly feeds on wild mustard, and several other hedge plants, and therefore it is not improbable, that when they smell the fragrance of the fresh bursting cotyledons of their favourite food, they would skip down from their spring habitations, the hedges, and make the attack. I first sowed some seed in a flower-pot, with earth out of my own garden; it produced the animal in abundance. Secondly, I enclosed the pot with pasteboard and canvass, with the same success; but still there was a possibility of the enemy getting in, as I had not the cover sufficiently close. Thirdly, I made a light frame about eight inches square, covering it with

very fine silk gauze, carefully stopping the crevices of the door with pasted paper, and round the pot where the cover was fastened on with putty, so that there was no possibility of any thing coming to it from without. Yet this experiment was attended with the same success; except that one point, a negative point, was now proved, namely, that the fly did not come to the turnip from other plants, and this was a point gained. Fourthly, I baked the earth in a cast-iron pot over the fire, and used no other water to water the seed but such as I had boiled myself, applying it at the bottom of the pot with a common feeder. Then I exercised the same care, and took the same precautions as before. I did not take off the cover till the plants were of a considerable size, and I found them all a-hop with beetles. I had now made another step; having before found that the beetles did not come from other plants, it was now clear that it was not in the earth or the water. Fifthly, with a lens I examined the seed, and found on it a number of white flattish substances; some of the seeds were without any, but there were generally one, two, three, four, and in one instance five on a single seed. These I concluded were eggs, and I thought the only way left me was to attack them. It would have been easy enough to poke them off with a needle, but I could not see how I was to employ a needle and a magnifying glass on a sack of turnip seeds. I therefore made some pretty strong brine, and soaked the seed in it for twenty-four hours, then dried it thoroughly, and with all the precautions which I have mentioned, I sowed it again, and there was not a single fly, neither was there a single turnip injured. I tried again and again, and I found that without weakening the brine, if the seeds were only kept in it three hours, there were no beetles, but yet the seed came up as well as ever. I now practise this method with turnip-seed, cabbage-seed, and in fact with all the cruciform plants in common cultivation, with very satisfactory success. The whole of these experiments were made on the Swedish turnip, which is generally more infested by these beetles than any of the other sorts.—*Entomological Magazine.*

[We some time ago mentioned, in regard to avoiding the attacks of the turnip-fly, that a farmer completely succeeded in avoiding them for many years, by rubbing, keeping, and sowing his turnip-seed among flour of sulphur. Since the turnip insect is attached to the turnip-seed, it is clear that the sulphur must have destroyed them. This attachment of the nidus of the insect to the seed is a very remarkable circumstance, and requires farther investigation than the experiments above related, to establish the fact as a general one.—*Editor, Q. J. A.*]

XXVIII. *Experiments on Smut in Wheat.*—"I first took sound grains from ears which had smuts also in them, but these did not produce a single smut. I next planted grains which were partly good and partly smut, and when I first discovered them I fully expected they would produce smut; but the result was otherwise; they produced every grain perfectly sound. I then took two handfuls of good sound grains, but rubbed them over with smut powder, one half of which I washed perfectly clean again with *water only*; I sowed one parcel impregnated with the smut powder, and the other which had been so impregnated but washed clean, in separate drills by the side of each other, but sufficient distance to be kept separate at harvest: the result was, that the

smutted end produced more than half smut, whilst the seed which had been smutted but washed clean, did not produce one ball. I conclude from these experiments, that smut is only produced from seed impregnated with smut-dust. The experiments were made about twenty years ago, and I have ever since acted on the conclusion, sowing the cleanest seed I could procure, with universal success."—R. B. *Lavington, Wilts, in a letter in the Universal Corn Reporter, March* 1833.

XXIX. *Remedy for Fruit-trees casting their Fruit.*—It is well known that although some trees of peach, apricot, plum, apple, &c. are well furnished with blossom buds, the blossoms often fail in their impregnation, and fall off; and when they are impregnated and set, they fall off at the stoning. Frequently although they survive the stoning, they become prematurely ripe and fall off; and very few if any of the fruit attain maturity, while those which do ripen become vapid and have no flavour. These failures have been proved to arise from unwholesome food, a remedy for which may be found in the following method: Having selected a tree that is in good condition, and well furnished with blossom buds, just as the blossoms are beginning to expand, take a potato fork, and with it make holes al lover the surface of the space occupied by the roots (which extend as far from the stem as the branches,) at about 18 inches apart, forcing in the fork to the full depth of the tines, and giving it a gentle heave, by pressing on the end of the handle; then having dissolved some nitre in water, in the proportion of 1 oz. to 3 gallons of water, fill the holes with the solution. No manure must be given; but if, after the stoning of the fruit the tree should appear unable to sustain its crop of fruit, the following preparation may be given, in the same manner as the nitre:—To one gallon of blood add one gallon of water, and one oz. of potash; stir the mixture well, and let it stand for a week or ten days; then pour off the solution from the clot, and, mixing 1 gallon of this liquid with 4 gallons of water, give it to the trees as above. The remaining clot may be dissolved by adding to it one quart of slaked lime, and one gallon of water to one gallon of clot; but this solution must not be given to *fruit*-trees, as it will produce the effect which the nitre is intended to remedy. It will, however, prove a good manure for the cabbage tribe, asparagus, celery, &c.—*Mr Joseph Haywood in the Gardener's Magazine.*

XXX. *Discoloration of the Leaves of the Rose-tree.*—In the autumn the leaves of the rose-tree, on their upper surfaces, are very often marked in various directions with broad brown lines, having a narrow black one running down the middle. This curious appearance is caused by the small caterpillar of a minute moth (*Microsetia ruficapitella*) which feeds inside the leaf when full grown; the caterpillar is nearly two lines long, of a yellow orange colour, with a brown mark down the back, the head very flat and sharp, and of a light chocolate. The brown mark on the leaf is caused by the drying of the epidermis, from the insect having eaten the parenchyma or substance of the leaf beneath. The black one is caused by its egesta, which, during its young state, entirely stop up the pores. When full grown, which is about the 24th of October, it eats out of the leaf, and crawls down the branches and stem, until it has found a convenient place to fix its cocoon. This is the only time it finds it necessary to make use of its legs, which seldom exceeds an hour, sometimes less. After having found a suitable place

which is generally about the spines or offsets of the branches, it begins to form its cocoon, by stretching out its body, and attaching a thread to the branch. It then turns its body to the other side, fastens it there, and, by proceeding in this manner on all sides, keeping the hinder part of the body fixed, it forms the upper part of the cocoon, or that exposed to the weather, which is convex and generally circular. The under part is oblong, shaped to hold the pupa; it is much smaller than the upper, which projects considerably beyond it on all sides. At one end the threads are not interwoven, and have a space through which the pupa can force a passage. This remarkable cocoon is very flat, and at first of a pure white, which is changed by the first shower of rain to a light orange. It afterwards assumes a deep brown colour, so nearly resembling the bark of the rose-tree as only to be distinguished by the practised eye. This change takes place very rapidly. The pupa is light brown, of an oval shape, about a line long, and half that in breadth. The perfect insect is produced in May; it is the sort called the Red-headed Pigmy; the upper wings are gold-coloured, with the hinder margin purplish, the head being reddish, and the expansion of the wings 2¾ lines.—*Entomological Magazine.*

XXXI. *The Candleberry Myrtle (Myrica cerifera.)*—This shrub is a native of the intertropical parts of America, and the curious and useful properties of its seeds render it a very remarkable vegetable production. It never attains a large size, seldom exceeding ten or twelve feet in height. Its blossoms appear about the middle of May, and then bear a great resemblance to the catkins or male flowers of the hazel nut. About the month of November or December, the seeds being ripe, a number of the natives, each taking with him the whole of his family, repair to the sea side, where these trees are found in abundance, for they appear to delight in a moist sandy soil. The berries when they are ripe have a great resemblance to bunches of small grapes, and form in clustres round the branches. Each family now builds a kind of temporary hut, covered with the leaves of different kinds of palm, and here they remain a fortnight or three weeks. The men having cut down the trees, the women and children busy themselves in stripping the branches of the fruit, which they throw into large iron pots, half filled with water; it is then boiled as long as any of the waxy substance, which the seeds contain, continues to rise to the surface. As fast as this vegetable tallow rises, it is skimmed off, and placed in brass vessels, where it is remelted and clarified. Its appearance, when cold, very much resembles bees-wax, and its colour is a dirty green. When formed into candles, it is usually mixed with about one-[illegible] of its weight of tallow; this causes it to burn with a brighter flame. It [illegible] and strong light, and, while it is burning, produces an extremely [illegible]t smell.

XXXII. *Oxalis crenata a rival to the Potato.*—This plant has been recently introduced into this country from Chili, and it is not improbable that it may shortly command the attention of the agriculturist as a rival to the common potato. In April last a small tuber of the root was planted by Mrs Hirst of Great Ropers, Warley, Suffolk, and the roots were taken out of the ground on the 5th October. The habits of the plant being very little known, this [illegible] first placed the tuber in a small pot, and then in the open ground of the

arden. It appears, however, this precaution is unnecessary, as the herbage rew very vigorously, and the leaves remained, and were but slightly injured y the frost until the roots were examined. Although the tuber planted did ot exceed half an ounce, the produce weighed upwards of four pounds. Beides the family at Ropers, several other botanists had visited and watched the rogress of this oxalis, and when a few of the tubers were boiled, all the arty admitted that, much as they resembled the potato, their flavour was lecidedly superior. This result is very promising, and when it is recollected hat our common potato (*Solanum tuberosum*), also from South America, was onfined to gardens more than a century, its tubers being small and watery, re may reasonably expect that cultivation will do much for the new plant. The stems were large, numerous, and diffuse; the flowers which appeared in August were yellow, and slightly notched, hence the epithet *crenata*. At resent the tubers somewhat resemble small kidney potatoes, inclining, howver to grow in an aggregate form.—*Horticultural Register.*

XXXIII. *Crucible for Fusion.*—Make a hole in a Hessian crucible, holding wo or three quarts; put inside of this crucible the cover of a smaller crucible, so hat it may rest about three-fourths of the depth; make with a file several notches around this cover to admit the air fairly, having the knob of the coer uppermost. On this knob place a little crucible containing the metal vhich must be covered; put some lighted charcoal around it, and then fill ip with coke, so as to cover entirely the interior crucible. Connect this apparatus with a blacksmith's or other bellows, and keep up a constant blast, supplying the waste coke as it is consumed; in the course of twenty minutes, he steel will be melted. Other minerals, even some that are reputed infusible, will yield in like manner. This simple and cheap apparatus abridges time nd labour surprisingly, and effects what, with the common and costly furaces, would be impossible.—*Jour. de. Con. Usuelles*, tom. xv. p. 143.

XXXIV. *The Chasseur Ants of Trinidad.*—One morning my attention was arrested at Laurel Hill by an unusual number of black birds, whose appearance was foreign to me; they were smaller but not unlike an English crow, and were perched on a calibash-tree near the kitchen. I asked the housenegress, who at that moment came up from the garden, what could be the cause of the appearance of those black birds? She said, "Misses, dem a sign of the blessing of God; dey are not the blessing, but only de sign, as we say, of God's blessing. Misses, you will see afore noon-time, how the ants will come and clear the houses." At this moment I was called to breakfast, and thinking it was some superstitious idea of hers, I paid no further attention to it.

In about two hours after this, I observed an uncommon number of *Chasseur-Ants* crawling about the floor of the room: my children were annoyed by them, and seated themselves on a table, where their legs did not communicate with the floor. The ants did not crawl upon my person, but I was now surrounded by them. Shortly after this the walls of the room became covered by them; and next they began to take possession of the tables and chairs. I now thought it necessary to take refuge in an adjoining room, separated only by a few ascending steps from the one we occupied, and this was not accomplished without great care and generalship, for had we trodden up-

on one, we should have been summarily punished. There were several ants on the steps of the stair, but they were not nearly so numerous as in the room we had left; but the upper-room presented a singular spectacle, for not only were the floor and the walls covered like the other room, but the roof was covered also.

The open rafters of a West India house, at all times afford shelter to a numerous tribe of insects, more particularly the cockroach, but now their destruction was inevitable. The chasseur-ants, as if trained for battle, ascended in regular thick files to the rafters, and threw down the cockroaches to their comrades on the floor, who as regularly marched off with the dead bodies of cockroaches, dragging them away by their united efforts with amazing rapidity. Either the cockroaches were stung to death on the rafters, or else the fall killed them. The ants never stopped to devour their prey, but conveyed it to their storehouses.

The windward windows of the room were of glass, and a battle now ensued between the ants and the *jack-spaniards*, on the panes of glass. The jack-spaniard may be called the wasp of the West Indies; it is twice as large as the British wasp, and its sting is in proportion more painful. It builds its nest in trees and old houses, and sometimes in the rafters of a room. These jack-spaniards were not quite such easy prey as the cockroaches had been, for they used their wings, which not one cockroach had attempted to do. Two jack-spaniards hotly pursued on the window, alighted on the dress of one of my children. I entreated her to sit still, and remain quiet. In an inconceivably short space of time, a party of ants crawled upon her frock, surrounded and covered the two jack-spaniards, and crawled down again to the floor, dragging off their prey, and doing the child no harm. From this room we went to the adjoining bedchamber and dressing-room, and found them equally in possession of the chasseurs. I opened a large military chest full of linens, which had been much infested; for I was determined to take every advantage of such able hunters. I found the ants already in possession of the inside; I suppose they must have got in at some opening at the hinges. I pulled out out the linens on the floor, and with them hundreds of cockroaches, not one of which escaped.

We now left the house and went to the chambers built at a little distance, but these were also in the same state. I next proceeded to open a storeroom at the end of the other house for a place of retreat, but, to get the key I had to return to the under room, where the battle was now more hot than ever. The ants had commenced an attack on the *rats* and *mice*, which, strange as it may appear, were no match for their apparently insignificant foes. They surrounded them as they had the insect tribe, covered them over, and dragged them off with a celerity and union of strength, that no one who has not watched such a scene can comprehend. I did not see one rat or mouse escape; and I am sure I saw a score carried off during a very short period. We next tried the kitchen, for the storeroom and boys' pantry were already occupied, but the kitchen was equally the scene of battle between rats, mice, and cockroaches, and ants killing them. A huckster negro came up selling cakes, and seeing the uproar, and the family and servants standing out

in the sun, he said, "Oh, Misses, you've got the blessing of God to-day, and a great blessing it is to get such a cleaning."

I think it was about ten when I first observed the ants, about twelve the battle was formidable; soon after one the great strife began between the rats and the mice: and in about three the houses were cleared. In a quarter of an hour more the ants began to decamp, and soon not one was to be seen within doors. But the grass round the house was full of them: and they seemed now feasting on the remnants of their prey, which had been left on the road to their nests; and so the feasting continued till about four o'clock, when the black birds, who had never been long absent from the *calibash* and *pois doux* trees in the neighbourhood, darted down among them, and destroyed by millions those who were too sluggish to make good their retreat. By five o'clock the whole was over: before sun-down, the negro houses were all cleared in the same way: and they told me that they had seen the black birds hovering about the almond-trees close to the negro houses, as early as seven in the morning. I never saw those black birds before or since, and the negroes assured me that they were never seen but at such times.—*Mrs Carnichael on the West Indies.*

XXXV. *White Monkey.*—A letter from Ramree of the 15th April 1827, makes mention of a perfectly white monkey that had been caught there. The hair on the animal's body was white, curly, and soft as silk, and excited great wonder and admiration among the natives. They represented that such a creature had never but once, to their knowledge, been seen in those parts, and that the king of Ava sent down a golden cage, with a host of people, to escort the animal to his presence, and expended besides 20,000 rupees in sacrifices and public rejoicings, auguring from the arrival of the extraordinary stranger, the most happy presages of good fortune. The monkey brought to our correspondent was one of the same description, but unfortunately it was too young and tender an age when caught. A Burmese woman, who was nursing an infant of her own, requested permission to suckle it, and fairly divided her maternal attention between the two. Pug lived in apparent good health and spirits for six days, but whether it was that its nursing disagreed with it, or that it was naturally very delicate, it died on the seventh day.—*Mr E. G. Ballard, Islington, in the Field Naturalist's Magazine, No. 9.*

XXXVI. *Lawson's Agricultural Museum in Edinburgh.*—We have already given a favourable opinion of these exhibitions, while noticing that of the Messrs Drummond at Stirling. We observe that Messrs Dickson and Turnbull, nurserymen, have opened a similar one at Perth; and our spirited friend Mr Lawson, seedsman and nurseryman to the Highland Society of Scotland,—spirited in every thing which regards the improvement of husbandry,—has presented the visitors of the Scottish Metropolis, with an opportunity of viewing the truly splendid collection of agricultural plants and seeds, which he has been for years preparing with so much perseverance and judgment. An article in the present Number of the Journal, from the pen of Mr Lawson, on the kinds and quantities of grass-seeds suited to alternate husbandry, permanent pasture, lawns, bowling greens, &c. will clearly show, at one glance, the great attention which he has shown to this most important, and hitherto too much neglected, portion of our husbandry. The benefits to be derived in

using the kinds of seeds best suited to the land to be sown down is incalculable. Every one has now an opportunity, in Edinburgh, of seeing every kind of grains, grasses, grass-seeds, roots, and plants, that can interest the farmer, the gardener, the forester, and the country gentleman. We think we cannot do better than give a slight sketch of the exhibition-room, as the shortest way of describing what is to be seen in it. It is a long room, situate in Hunter's Square, near Mr Lawson's shop. The floor is occupied with six tables, about 12 feet long, and proportionally broad, covered with green baize, each of which is surmounted with an open platform, also covered with the same material. The first table is occupied with the *Cereal Grains*; bundles of which in the straw, neatly tied up, are stuck upright on pins on the top of the platform, and properly arranged, while the table is covered with boxes containing the seeds of all the plants exhibited above them. Some of the more remarkable grains are Indian corn, millet, and buckwheat, and some ornamental grasses are introduced beside them. The second table contains, in the same manner, specimens in the straw of the *Leguminous* plants, such as beans, pease, &c., and their seeds are placed under them on the table. The most remarkable of this kind of plants is perhaps the *Lathyrus sativa*, which may be eaten with impunity in the straw while green, but the seeds of which, when ripe, are poisonous. It is cultivated in France and Switzerland; in the latter country the flour of it is mixed with wheaten flour. Tables 3d and 4th are occupied with the beautiful set of agricultural implements belonging to the Highland Society, made by Messrs Slight and Lillie of Edinburgh. The Society has shown a laudable feeling in thus countenancing the exhibition of Mr Lawson. The fifth table is wholly occupied with 102 varieties of the potato, all raised by Mr Lawson, and arranged into seven classes: 1*st*, forcing for early use; 2*d*, earlier garden; 3*d*, earliest field; 4*th*, early field; 5*th*, medium field; 6*th*, very late field; and 7*th*, for cattle feeding. The platform of this table is furnished with specimens in the straw of the weeds of agriculture. The platform of the sixth table supports plants of curious interest,—those which are cultivated for their fibre, such as hemp, flax, &c. The New Zealand flax which is attracting attention is a kind of iris, and is the most remarkable of this class;—those cultivated for the oil are the olive, rape, &c.;—those for their dyes, are the indigo, madder, woad, &c. There is a number of plants for various economical purposes, such as the sugar-cane, tea plant, ginger, coffee, caraway, barilla plant, tobacco, chiccory, comfrey, the teasel, the sunflower, the castor-oil plant, the opium poppy, cinnamon tree, and the papyrus. A side-table contains 30 varieties of the turnip, raised by Mr Lawson; and other roots sent by exhibitors. Another side-table contains carrots, red and white varieties; beet, of varieties; parsnips, of varieties. The walls of the room are covered with specimens of cultivated plants. Wheat, barley, and oats, in varieties, are placed in small glazed mahogany cases against the wall; and large black-coloured frames contain papers of dried plants used in culture, arranged into the cereal, gramineous, herbage, leguminous, and economical. Part of table sixth is at present occupied with specimens of wood, and seeds of the various kinds of trees and shrubs used for ornament and shelter. In an anti-room is a cabinet containing a complete Hortus Siccus, a description of the plants in which are graphically given in a book accessible

to all visitors. This room also contains a glazed case, filled with the various kinds of garden and orchard fruits cultivated in this country. The embryo of an agricultural and botanical library occupies an appropriate place in this anti-room.

QUARTERLY AGRICULTURAL REPORT.

NOVEMBER 1833.

THE weather, during harvest, was very favourable, and particularly towards the latter end of it, which permitted the grain in the upland districts to be gathered in in good order. Scarcely any part of the crop has been injured by the weather, though much of it has been rather hastily carried, under the apprehension of injury, as was so much the case last year. In this respect the barley-growers in England have escaped the injury which overtook them to so lamentable a degree last year. Now that the whole crop has been gathered in to the stack-yard, we would pronounce it of much less bulk in the straw than that of last year. In our last Report, we stated that the straw was thinly set in the ground, and that the excessively hot weather in May had checked its longitudinal growth. These rather alarming appearances caused much apprehension in the minds of farmers in regard to the quantity of its produce. But we stated that we thought the crop a good one on the ground, because we saw every where, and on every kind of land, a large full ear of corn surmounting the thinly set and short straw; and, accordingly, we are glad to find that wheat, barley, and oats, are above an average crop in Scotland. Wheat, we have no doubt, will yield considerably more than an average crop: the quality is generally fair, the weight varying from 61 lb. to 65 lb. per bushel. In Dimsdale's Universal Corn Reporter, of the 4th November, we find it stated that, in the southern and western counties of England, "we find, almost universally, the opinion to prevail, that the wheat crop is not generally more than two-thirds of an average; many farmers assured us, that, on *reaping*, they thought the field would be extremely satisfactory, but, on *thrashing*, the result proved quite the reverse." In the north of England, in Northumberland, on the other hand, several farmers have assured us that the wheat is yielding beyond their expectations. One comfort still remains to be told, that the stock of old wheat every where is more abundant in the hands of the farmers than it has been for many years previous to this. The farmers are not disposed to sell at the present prices, which vary from 48s. to 60s. per quar-

ter, according to the lowest quality of the new, and the highest quality of the old wheat,—from the prevailing opinion among them that as the prices of cattle and wool are high, and the manufactories are fully employed, and commerce in an active state, except the corn trade, those of grain must also soon experience an advance. Barley will prove rather above an average, and the quality, in many instances, is remarkably fine, though this grain is less uniformly fine than wheat. The late sown is thin and husky, having ripened unequally. Malting samples weigh from 54 lb. to 57 lb. per bushel. Oats will not, upon the whole, exceed an average crop, though there is plenty of straw. Samples indicate an inequality in the ripening. Beans, though good in quality, cannot be considered a full crop. Pease are superior to beans, both in quantity and quality. The failure in the braird of potatoes naturally excited alarm in the early part of the season. They have much improved during the fine weather in autumn, though their produce must necessarily be far short of a full crop. Their quality, however, is excellent. Turnips are blanky on inferior soils, and they have not improved, as we expected they would, during the long nights of October, in consequence of the prevalence of frost. They will therefore be a generally deficient crop. Of all the kinds cultivated, the Swedish are by far the best crop. They are undoubtedly the best and hardiest turnip in cultivation. Every farmer ought to sow the half of his turnip land with this invaluable root, which will become the more appreciated the more it is known. There is scarcely a species of soil on which Swedish turnips will not thrive, provided it is clean, and manured with a small extra quantity of dung, and the seed early sown, not later than the middle of May. These advantages can easily be extended to them, when bone-dust can now be so easily obtained for the other varieties of turnip. The price of turnips this winter, for eating off with sheep, is likely to be 3½d. per head per week, for hoggs—a price fully 50 per cent. higher than that of last year. The hay crop has been both abundant and of excellent quality. The aftermath has been much stinted by the effects of frost during the nights in autumn, very few mild nights having occurred. Cattle and sheep have consequently not improved in feeding, and they have the prospect of but a stinted supply of food during the winter. Fat stock will therefore be scarce. Indeed, their scarcity this autumn is unprecedented. The markets of Falkirk, Doune, and All-Hallow, have been well supplied with wintering cattle, and they have met with ready sales at high prices. The meat market in Edinburgh realizes, at the best, from 5d. to 6d. per lb. imperial. The wool has not fetched, for many years, so high as this

season. All the old stock has been eagerly bought up for about 36s. per stone of 24 lb., and the price has kept advancing till now. The prospects of the stock farmer are at present encouraging. This encouragement will be a relief to him; for years past he has been struggling for a bare subsistence.

The reports from England are not of the most flattering kind in regard to the produce of the crops. All the kinds of grains are represented as under an average, and even the quality is in many places inferior. We suspect our English neighbours place too much confidence in their climate, fine as it is. The practice of laying grain, particularly barley, in swath upon the ground for some days to prepare it for conveying it to the stack, may be very commendable in some seasons; but no plan can be worse in a showery or precarious harvest. Damaged grain is the natural forfeit of such a slovenly practice.

In Ireland the crops are spoken of as good in quantity and quality. It must be, however, kept in remembrance, that heavy gales of wind, attended with rain and a low state of the temperature, prevailed in Ireland, when we had the fine weather in July and August in Scotland; and that it is probable the quality at least, if not the quantity, of grain in Ireland will have been affected by it. At all events, the potatoes are considered an inferior crop in Ireland this season, both in quantity and quality.

Upon the whole, the crop of 1833 may be considered of superior quality, though the quantity over the whole kingdom may not be more than will be required for the actual consumption of its inhabitants. But the superior quality will cause the crop to go far. This consideration, along with the stocks of old corn in the country, which are abundant, must banish the idea of famine or want for another year. However the state of things may operate upon the condition of the farmer, it is a pleasing consideration for the statesman and patriot.

Since the appearance of our last number, the Committee of the House of Commons on the State of Agriculture have published their report. It is a very voluminous document: we consider it, in one point of view, a very important one, namely, it proves the very distressed state of the farming interest in England. The report is not so strongly expressed as the evidence would warrant; nor is the evidence so strong as might have been obtained. Why was the evidence confined to the testimony of agents, surveyors, and valuators? Why were not farmers, yeomen, and labourers in England, brought before the Committee to tell their own "tale of woe?" Was it because the

tale of misery is rendered more "tunable to gentle ears," when narrated by those who only see its reality, than by those who feel it? And why was not the price of foreign corn ascertained from those who are intimately acquainted with the foreign markets?

The evidence, which occupies 700 folio pages, prove these melancholy facts:—That the land is worse cultivated in most counties of England now, and especially these last four years, than it was during the war, when the price of corn was high: that less labour is bestowed on all kinds of land than formerly, and particularly on the inferior classes of soils: that the produce of all kinds of soils has decreased, especially on the inferior soils: that, in consequence, less corn remains in the hands of the farmers at all times of the year than formerly: that the whole expenses of cultivation, including rent, are not much less than they were during the war, though the price of corn has fallen 50 per cent. since then: that rents have been reduced about 25 per cent.; but the reduction of rent has given no relief to the farmer, as the poor rates have greatly increased: that the farmers are obliged to pay labourers whether they employ them or no: that, in consequence of these circumstances, farmers have lost, and are losing, part of their capital every year: that farmers, in many parts of England, are now obliged to work when they used to employ labourers: that they allow the farm-buildings to fall down rather than be at the expense of repairing them: that they give up one farm, and take another, from year to year, in the hopes of improving their condition: that they will not now enter into new leases for farms, as corn bears an uncertain value in the markets: that this system of shifting from farm to farm has thrown much of the inferior land out of cultivation altogether, as they will only work the best lands. Such is the present lamentable condition of the tenantry in England. In regard to the yeomen, the small proprietors, the evidence states,—that they have continued to cultivate their own land, till the mortgages upon them have exceeded their value: that, in consequence, many of these small properties have passed into the hands of large proprietors: that those yeomen who have some income left, now let their properties to farmers rather than encounter the risks of cultivation: that many yeomen even work their own land, whereas formerly they employed labourers for that purpose: that their condition in living has been very much reduced, even more so than that of the small farmers: that yeomen and farmers will suffer every privation, even distraint, rather than relinquish their profession: that the great cause of the despondency of landholders in England arises from the uncertainty in the price of corn by the continual tampering with the corn laws. . . .

The evidence proves that the condition of the labourers who are in constant employment is much better than that of their employers. All the necessaries of life are within their reach, either of food or clothing, and they can command many of the comforts if they choose. The unemployed labourers, on the other hand, are in a miserable condition. Their bare wants are obliged to be supplied by the sinking farmers, through the means of the increasing poor-rates; but, what is worse, their moral habits have been much deteriorated by idleness. The beer shops—according to the evidence given before the Committee of the House of Commons on the Beer Shops—are the common rendezvous of these idle labourers. There they quarrel among themselves, and plot and hatch every species of mischief against others. There those poor farmers who will not, because they cannot afford to, employ them, are marked out as the victims of incendiarism. There is no fact more completely established by the evidence than this,—that there are not more labourers in England than could be beneficially employed in the cultivation of the soil, provided the farmers could afford to employ them. This single established fact is quite sufficient to demolish the whole Malthusian theory of the possibility of the population increasing beyond the means of subsistence. It is possible, however, by deteriorated husbandry, to diminish the supply of subsistence below the wants of the population. This, we fear, is the present state of England.

Contrasted with those of England, the farmers of Scotland are at present better of. This favourable circumstance in their condition, must, we think, be attributed to the mode of paying the wages of farm-servants, and the better administration of the poor laws in this country. The farm-servants in Scotland receive the principal part of their wages in farm produce; and when farm produce was at the highest price, during the war, they received no more of that produce than they do now when its price is much reduced, because then and now they receive no more than is necessary for their subsistence. This rate of wages has for a long period remained stationary, while the price of produce has very much fluctuated; so that, if the farmers in Scotland derived a high profit from the comparatively low rate of the wages of the farm-servants during the war, they are content to submit to some loss now when that rate remains the same, and is comparatively high. The farmer in Scotland never grudges to pay good wages to the labourer whom he employs, because he is not burdened with his support when he does not require his services. The unemployed able-bodied labourer in Scotland must either find out work for himself, wherever he can find it, as the law of settle-

ment puts no restriction upon him in this respect, or he must depend on his relations for support. No able-bodied labourer can obtain relief from the parish funds unless he is sick. Under any circumstances, it is not the farmers, but the landed proprietors, who support the parochial poor.

Strong as are most of the facts which are derived from the evidence, the Committee nevertheless express themselves on these subjects in these very mild terms: "On the whole, it must be admitted that the difficulties are great, and the burdens heavy, which oppress the landed interest; but contracts, prices, and labour, have a strong natural tendency to adjust themselves to the value of money once established, and it is to be hoped that the balance may be restored which will give the farming capital its fair return.

"Your Committee has endeavoured to trace the injurious effects of past legislation; and to prove the caution necessary in future measures, it may be urged, that they have stated many evils, but have failed to suggest remedies: it should, however, be remembered, that legislative measures once taken and long established, can rarely be abandoned without danger, and that to retreat is occasionally more dangerous than to advance.

"In conclusion, your Committee avow their opinion, that hopes of melioration in the condition of the landed interest, rest rather on the cautious forbearance than on the active interposition of Parliament."

The reason given for the omission of the report on the evidence adduced before the Committee of the House of Commons on the State of the Commerce and Manufactures of the kingdom is, that the Committee could not agree among themselves whether distress exists in the manufacturing districts. In the Committee on Agricultural Affairs, on the other hand, no difference of opinion was expressed on the reality of the distress which depresses and has depressed the agricultural interest. The Committee are quite unanimous on that point, however weakly they may have expressed their opinion of it. In this respect, then, the manufacturing is in a more flourishing condition at present than the agricultural interest. All the remedy which they propose for this agricultural distress is forbearance on the part of Parliament, and of course patience on the part of the agriculturists. Patience is a very amiable virtue when supported by Hope; but, when Hope deserts her, Patience is a very helpless ally. But will Parliament forbear meddling with the interests of the agriculturist? Will they forbear meddling with the corn laws? We doubt it. We are certain the question of their abolition will be discussed next session, for notices to that effect stand recorded in the books of the Honourable House. What the issue of the discussion may be we dare

not predict, for we have now no fixed principle from which to draw a safe conclusion in regard to the proceedings of the House; and we confess we have very little confidence to hope for a favourable issue to the agriculturists, for the manufacturing interest evidently possesses a preponderating influence over the agricultural in the House. In fact, the agricultural interest is now quite at the mercy of the manufacturing.

Straws thrown up into the air foretel the direction of the coming storm. In like manner, we may anticipate the clamour which will be again raised against the corn laws. Already the liberal press are striking the note of preparation. Already we are told there can be no prosperity for the country as long as corn laws exist. By their abolition, we are told that the languishing farmers will be supported by the thriving manufactures. It is quite hopeless to point out to such reasoners the nature of the evidence delivered before the Agricultural and Manufacturing Committees. Before the latter Committee, the evidence adduced proves the prosperous state of the manufacturing interest. Mr Bates, of the house of Baring, Brothers, and Company, states, in regard to the thriving state of the cotton manufacture in Liverpool, Manchester, and part of Yorkshire, "That, to my view, there never was so secure and healthy a state of things, whether you look to the present state of things here, or to the probable state of things for several years to come, supposing that every thing remains tranquil here, and that there is nothing to shake public confidence." The cotton entered for home consumption has, from 152,829,633 pounds, risen in 1831, to 273,249,653 pounds. Of the woollen trade, Mr H. Hughes, an extensive wool-broker, says, "I consider that the woollen manufacturers of this country were never better employed than at the present moment. There is more manufactured at present than there has been in any year within the memory of the oldest man living." The iron manufacture is stated to be rapidly recovering from its depression. The silk trade is also stated to be improved; it has increased 50 per cent. in exported goods since 1830. The retail trade, throughout the country, is said to keep pace with the wholesale business: and, of the transactions of the small dealers, it is stated by Mr Lewis Lloyd, a banker, that "bills are now paid more regularly than he ever knew them." These are all signs of prosperity, and happy are we to contemplate them for the sake of our much loved country. Since this prosperity is real, what can the Edinburgh Review mean by saying, that "the corn laws, in their present state, inflict the most serious injury on the commerce and manufactures of the country?" We are told that the prosperity of the manufacturing classes confers immediate benefit

the farming interest. How happens it, then, that the farmers are at present deeply distressed; that their working stock is reduced; that their capital is diminished; that the soil is deteriorated in fertility; and that land of an inferior description has been thrown out of cultivation, in spite of the remedial influence of this manufacturing prosperity?

Mr Cobbet has lately written a very amusing article in his Register, on the corn laws, abounding in valuable facts and reasoning, a portion of which we cannot refrain inserting. After mentioning several heavy taxes which are exacted on certain manufactured articles, when imported, he says, "But now comes the question, Why am I to pay 25 per cent. on my implements of husbandry? And why are those who consume the produce of my farm to be supplied with such produce, by foreigners, without any tax at all? Answer me that question, corn-bill gabblers. Answer me that question, and cease your gabble about 'cramping the industry of the country.' The industry of the manufacturers and artizans is 'cramped,' is it, by keeping their mouths from foreign corn; and is not the industry of the country cramped by preventing the cultivators of the land from having waggons and implements of husbandry from foreigners: and is it not 'cramped;' is not the industry of that greatest body of all the industrious persons, the farmers and labourers, is it not thus more cramped than it is possible for it ever to be assisted by a corn bill?

"The corn-bill gabblers have already their answers here. They are answered, and they can no more reply to this answer, than they can bring themselves to believe that they are the greatest fools upon the face of the earth, though that is a fact visible so all other eyes. But I will go a step farther, as my hand is in, in order to show how very little these gabblers appear to know of the matter. I always contended that the corn bill never could be a protection to the land, except in a very limited degree; that the price would vary with the season and the crop; and that it would farther vary with the changes in the currency; and that no corn bill that could possibly be devised would afford any permanent protection. And now, at this moment, what protection does it afford? The six sorts of [illegible] are all as cheap as they were, upon an average of years, for the whole of the last century, up to the commencement of the Bourbon war, which was undertaken to prevent parliamentary reform in England. What harm does the corn bill do now, then? What! Do you want corn cheaper than it used to be in the times of your great-grandfathers? What sense is there in this clamour, then? When the wheat was at its present price, before the French war, you had

four pounds of bread for fivepence halfpenny, and now you give eightpence halfpenny for the four pounds of bread; and why dont you set your wise heads to discover the cause of this? The farmers are selling you cheap corn, and the bakers are selling you dear bread. Why do you not begin your inquiries here? Cut off a slice of a loaf, smell to it, and start from that. Go ask the baker why he so extorts from you? Oh! no! He will tell you in a minute that if you will not give him eightpence halfpenny you must let it alone, and live without bread; for that he has taxes of all sorts to pay, which his old father, keeping the same shop, knew nothing of; and that if he does not get eightpence halfpenny he must shut up shop. It is not the corn bill, it is the taxing bills: repeal, then, taxing bills, and particularly the malt-taxing bill, before you hazard your reputation for common sense by bellowing about the corn bill."

"Let me not be told, then," says Mr Cobbet, "that a corn law is an act of tyranny; that it is a novelty in legislation; that it must be in its nature oppressive to the people of a country in which it exists; and, whatever else we may know upon the subject of the corn bill, I trust we shall be spared the hearing of heaps of bombastical nonsense like this."

FOREIGN CORN MARKETS.

THE languid state of the Foreign Corn Markets deprives any account of them of interest. We shall only observe that the harvest which has been completed in the lower Baltic, Germany, and Denmark, has secured a crop pretty similar to our own in character; namely, less bulk of straw, but superior quality of grain to last year. Much of the grain, however, has been harvested in a damp state, on account of the prevalence of rainy weather; so that the new wheat cannot be safely shipped without an admixture of old. This circumstance serves to maintain the price of old wheat. In Russia there is a great failure in the crops, so much so, that the ports in the Baltic, the Black Sea, and the Sea of Azoff, are declared open for the admission of corn free of duty. The demand from Russia will chiefly be for rye, but still that must have some effect on the price of wheat on the Vistula and the Bug. The crops about Rouen and Bayonne are not favourably spoken of. The Nile has risen but little this year, much below its usual mark, which will probably have an effect on the prices of corn in the south of Europe. In Canada the crops are good, though a considerable portion of them has been carried in a damp state.

The last quotations from Hamburg, of date the 29th October, for new red wheat, best weighing from 60 lb. to 62 lb. per bushel, from 28/ to 30/ per quarter. For best wheat of 58 lb. or 60 lb. per bushel, from 33/ to 36/ per

quarter. Rye, 20/ to 21/ per quarter. Barley, 13/ to 17/. Saale, 20/. Oats, 9/ to 11/. Beans, 20/ to 23/. Peas, 20/ to 25/. Rapeseed, L. 24 to L. 26 per last. Rape cakes. L. 4, 4s. Linseed cakes, L. 6, 10s. to L. 7, 10s. per ton. Red clover seed, 30/ to 48/. White, 30/ to 48/ per cwt. all free on board.

The extraordinary activity in the German wool markets, renders an account of them interesting. The price has started from 30 to 40 per cent. above last year. There is no wool left in the hands of the farmers, and even the quantity in the hands of the dealers is much smaller than at any former period. The following extract of a letter from Leipsic from a person who seems to be well acquainted with the state of the German woollen manufactures shows an activity among the German manufacturers, which the woollen manufacturers in this country would do well to consider. "The consumption of wool," says he, "in Germany and the Netherlands has increased amazingly, and we safely say, that at the very utmost, only one-fourth of the wool produced in Germany is exported to England. The German manufacturers go on very briskly, the number of looms increases daily, and if they continue to proceed so for a few years, they will be able to consume the whole produce of German wool, without being obliged to have recourse to the English market. The manufacture of woollen yarn has been quite neglected, but within the last few years it has been very much cultivated, and has made such a rapid progress, that there are now worsted yarn spinners in Germany, who consume 30,000 to 40,000 cwts. a-year; combing wool is therefore very much looked after, and there will be a deficiency in the quantity imported into England. Things have changed now, and instead, as in former times, the English being the rulers at the German wool fairs, the German and Belgian manufacturers are predominant, and pick the flower of the wool, as they are able to afford higher prices than English buyers."

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 10th of October 1832, and 10th of October 1833, showing the Increase and Decrease on each head thereof.

	Quarters ended October 10.		Increase.	Decrease.	Years ended October 10.		Increase.	Decrease.
	1832.	1833.			1832.	1833.		
	£	£	£	£	£	£	£	£
Customs, . .	4,696,129	4,272,449	..	423,680	15,201,299	15,240,007	38,708	..
Excise, ...	4,668,188	4,771,309	103,121	..	14,956,307	14,542,957	..	413,350
Stamps, . . .	1,658,032	1,681,726	23,694	..	6,558,159	6,499,529	..	58,630
Post-Office,	333,000	371,000	38,000	..	1,313,000	1,400,000	87,000	..
Taxes, ...	656,959	652,129	..	4,830	5,022,324	4,995,180	..	26,144
Miscellaneous,	9,402	4,394	..	5,008	46,331	64,816	18,485	..
	12,021,710	11,753,007	164,815	433,518	43,097,420	42,733,489	144,193	498,124
	Deduct Increase, . .			164,815	Deduct Increase, .			144,193
	Decrease on the quarter,			268,703	Decrease on the year,			353,931

TABLES OF PRICES, &c.

ge Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets :—

LONDON.

heat.	Barley.	Oats.	Rye.	Pease.	Beans.
d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
9	27 4	20 0	32 6	38 0	33 2
10	26 1	19 4	33 6	39 0	33 6
6	26 6	19 7	33 9	39 3	32 8
10	27 4	20 0	34 0	39 9	33 5
1	27 6	19 8	33 4	40 0	34 7
4	28 2	20 10	33 1	39 6	34 5
6	28 7	19 10	34 0	39 10	36 0
7	30 10	21 1	35 0	40 0	35 5
8	29 9	21 4	35 6	40 6	35 2
1	33 4	21 7	36 0	41 0	34 2
5	32 9	21 3	35 6	41 6	34 1
0	36 1	21 7	36 6	42 0	33 7
9	38 1	20 10	35 4	43 0	32 11

LIVERPOOL.

heat.	Barley.	Oats.	Rye.	Pease.	Beans.
d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
7	31 1	19 0	32 0	38 0	37 2
4	27 0	18 10	32 4	38 0	38 3
3	26 6	18 6	33 0	38 4	40 0
4	26 2	18 10	33 6	37 9	37 5
0	26 6	18 8	34 0	37 4	37 6
9	27 5	19 1	33 9	38 3	40 0
10	29 0	19 0	34 0	39 3	40 0
2	27 10	18 10	33 11	40 2	42 3
0	29 6	19 6	35 0	42 0	43 6
2	25 5	19 9	36 0	41 2	42 5
5	28 6	19 2	35 6	40 6	43 4
8	34 4	18 4	35 0	40 2	42 5
0	35 3	18 8	34 0	40 4	40 8

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Bar. 9 St.
1833.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Aug. 2.	30 10	15 6	13 2	9 10	17 6
9.	30 0	16 0	12 1	10 2	17 6¼
16.	25 9	15 0	11 10	10 5	17 6
23.	26 8	15 9	12 0	10 6	17 5
30.	26 0	15 0	12 2	10 5	17 6
Sept. 6.	25 5	15 6	12 4	10 6	17 6
13.	26 0	16 0	12 6	10 6	17 4
20.	24 6	13 6	12 3	10 7	16 7
27.	23 9	13 3	12 2	9 10	16 7
Oct. 4.	23 4	13 2	11 3	9 3	16 5
11.	23 10	12 9	11 10	9 0	16 3
18.	24 5	12 7	11 6	9 2	16 6
25.	25 0	12 6	11 8	9 3	15 9

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.	Beans.
1833.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Aug. 7.	55 2	27 3	19 7½	30 6	32 0
14.	56 5	28 0	19 2	29 6	31 6
21.	56 0	32 10	20 0	30 0	32 0
28.	55 4	28 8	20 0	31 6	32 6
Sept. 4.	57 8	28 6	20 5	31 6	32 6
11.	57 6	28 6	21 10	31 6	32 0
18.	58 1	28 4	21 4	30 6	32 0
25.	56 9	29 2	20 4	30 6	33 0
Oct. 2.	55 1	29 9	20 3	31 0	33 0
9.	56 4	30 10	20 10	33 0	34 6
16.	57 5	32 0	21 0	33 6	34 9
23.	59 3	32 0	21 6	33 6	34 0
30.	57 0	32 2	21 0	33 2	34 2

showing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN N ; the Duties payable thereon, from 1st August to 1st October 1833.

heat.			Barley.			Oats.			Rye.			Pease.			Beans.		
ggregate Average.	Duty.		Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
d.	*s. d.*		*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1	31 8		27 0	26 3	22 10	19 4	19 1	18 3	31 11	32 0	21 3	37 4	38 1	12 6	34 5	34 3	18 3
4	31 8		26 0	26 1	22 10	19 4	19 2	18 3	33 5	32 2	21 3	37 10	38 4	12 6	34 6	34 3	18 3
3	31 8		26 6	26 1	22 10	19 4	19 2	18 3	34 3	32 5	21 3	37 7	38 4	12 6	35 1	34 5	18 3
5	31 8		27 2	26 4	22 10	19 7	19 4	18 3	32 10	32 5	21 3	38 1	38 3	12 6	36 7	34 10	18 3
5	31 8		27 10	26 8	22 10	19 3	19 4	18 3	33 4	33 1	19 9	35 10	37 9	14 0	36 3	35 8	16 9
2	31 8		28 6	27 1	21 4	19 10	19 5	18 3	33 1	33 6	19 9	37 3	37 4	14 0	37 7	35 9	16 9
11	32 8		29 6	27 6	21 4	19 6	19 6	18 3	35 9	34 1	18 3	36 6	37 9	14 0	37 10	36 4	15 6
7	32 8		30 2	28 3	19 10	19 11	19 7	18 3	35 2	34 5	18 3	37 8	37 2	14 0	38 2	36 11	15 6
4	32 8		30 8	29 0	18 4	20 2	19 9	18 3	35 8	34 8	18 3	38 3	37 5	14 0	39 4	37 5	14 0
1	32 8		31 4	29 8	18 4	19 10	19 9	18 3	36 4	35 3	16 9	40 6	37 10	14 0	38 8	37 5	14 0
8	33 8		30 8	30 2	16 10	20 0	19 11	18 3	33 11	35 4	16 9	40 9	38 8	12 6	36 5	37 6	14 0
1	33 8		30 6	30 6	16 10	19 7	19 10	18 3	36 9	35 7	16 9	42 0	39 6	11 0	35 10	37 2	14 0
6	34 8		30 5	30 8	16 10	19 9	19 11	18 3	34 1	35 4	16 9	42 0	40 4	9 6	36 1	36 11	15 6

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Qua Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Q upon which duties have been paid for home-consumption, during the same Month; and th tities remaining in Warehouse at the close thereof: from 1st August to 1st October 1833.

1833. Month ending	IMPORTED. From Foreign Countries.	IMPORTED. From British Possessions.	IMPORTED. Total.	CHARGED WITH DUTY. From Foreign Countries.	CHARGED WITH DUTY. From British Possessions.	CHARGED WITH DUTY. Total.	REMAINING IN WARE From Foreign Countries.	REMAINING IN WARE From British Possessions.	
Aug. 1.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Q
Wheat, . .	10,637 6	15,435 1	26,072 7	18 6	12,310 5	12,329 3	356,629 6	13,678 2	5
Barley, . .	15,277 5	..	15,277 3	1 2	..	1 2	32,647 6	..	3
Oats, . .	2,269 2	..	2,269 2	..	..	..	204,305 7	..	20
Rye, . .	..	..	..	..	..	..	4,731 3	..	
Pease, . .	402 4	0 1	402 5	3 7	0 1	4 0	3,452 0	..	
Beans, . .	1,668 2	..	1,668 2	1 2	..	1 2	24,487 4	..	2
Totals, .	30,255 3	15,435 2	45,690 5	25 1	12,310 6	12,335 7	826,254 2	13,678 2	83
Sept. 1.									
Wheat, . .	13,843 2	23,418 2	37,261 4	59 4	9,402 3	9,461 7	567,236 0	27,572 6	59
Barley, . .	8,708 5	..	8,708 5	..	..	..	41,236 2	..	4
Oats, . .	2,008 5	..	2,008 5	4 6	..	4 6	210,456 5	..	21
Rye, . .	0 6	..	0 6	0 6	..	0 6	4,731 3	..	
Pease, . .	320 4	..	320 4	513 6	..	513 6	3,242 7	..	
Beans, . .	..	..	..	235 1	..	235 1	24,252 3	..	2
Totals, .	24,881 6	23,418 2	48,300 0	813 7	9,402 3	10,216 2	851,155 4	27,572 6	8,77
Oct. 1.									
Wheat, . .	48,402 2	22,064 6	70,467 0	151 6	8,936 4	9,088 2	614,408 4	40,754 5	65
Barley, . .	21,450	..	21,450 7	4 3	..	4 3	62,656 6	..	6
Oats, . .	6,417 5	..	6,417 5	24 4	..	24 4	215,870 7	..	21
Rye, . .	1,597 5	..	1,597 5	..	..	..	6,339 0	..	
Pease, . .	970 3	..	970 3	899 7	..	899 7	3,297 2	..	
Beans, . .	6,535 2	..	6,535 2	763 1	..	763 1	29,974 0	..	2
Totals, .	84,374 0	22,064 6	107,438 6	1,843 5	8,936 4	10,780 1	932,526 3	40,754 5	97
Aug. 1.	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	wt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cw
Flour, . .	8,047 1 18	15,714 2 21	23,762 0 11	5 1 10	13,882 3 12	13,888 0 22	458,099 2 3	23,488 1 7	48
Oatmeal, .	72 3 2	..	72 3 2	..	..	..	2 2 20	82 2 11	
Totals, .	8,120 0 20	15,714 2 21	23,834 3 13	5 1 10	13,882 3 12	13,888 0 22	458,102 0 23	23,570 3 18	48
Sept. 1.									
Flour, . .	1,133 2 10	11,244 2 25	12,378 1 7	5 1 26	13,996 2 3	14,002 0 1	445,778 0 6	20,734 2 26	46
Oatmeal, .	0 0 16	..	0 0 16	0 0 16	..	0 0 16	..	82 2 11	
Totals, .	1,133 2 26	11,244 2 25	12,378 2 23	5 2 14	13,996 2 3	14,002 0 17	445,778 0 6	20,817 1 9	46
Oct. 1.									
Flour, . .	14,388 3 6	14,489 0 10	28,877 3 16	17 3 15	10,798 1 22	10,816 1 9	425,184 3 20	24,455 2 23	44
Oatmeal, .	..	..	..	..	..	..	..	82 2 11	
Totals, .	14,388 3 6	14,489 0 10	28,877 3 16	17 3 15	10,798 1 22	10,816 1 9	425,184 3 20	24,538 1 6	44

PRICES of BUTCHER-MEAT.

Date.	Smithfield, *Per Stone of* 14 lb. Beef.	Smithfield, *Per Stone of* 14 lb. Mutton.	Morpeth, *Per Stone of* 14 lb. Beef.	Morpeth, *Per Stone of* 14 lb. Mutton.	Edinburgh, *Per Stone of* 14 lb. Beef.	Edinburgh, *Per Stone of* 14 lb. Mutton.	Glasgow, *Per Stone of* 14 lb. Beef.	Glasgow, *Per Stone of* 14 lb. Mutton.
Aug.	7/ @ 8/3	7/ @ 8/	6/6 @ 7/3	6/ @ 7/	6/ @ 7/	6/6 @ 7/3	6/6 @ 7/6	6/ @ 7/3
Sept.	7/6 8/6	7/3 8/3	7/ 7/6	6/3 7/6	5/9 6/9	6/ 7/	6/6 7/6	6/3 7/
Oct.	7/6 8/	7/ 8/	7/ 7/3	6/9 7/	6/ 7/	6/3 7/3	6/3 7/3	6/6 7/6

PRICES of English and Scotch WOOL.

..., per 16 lb.—*Merino*, Washed, 30/ @ 34/; in Grease, 21/ @ 25/.—*South Down*, 22/6 @ 25/ ..*cester*, 21/ @ 24/6; Ewe and Hogg, 20/ @ 24/.—Ewes, 18/ @ 22/.—*Locks*, 17/6 @ 18/6; *Moor*, Ewe ... gg, 12/ @ 14/.

SCOTCH, per 24 lb.—*Leicester*, 32/ @ 36/6; Ewe and Hogg, 29/ @ 32/.—Ewe, 25/ @ 28/.—*Cheviot*, Whi ... White, 15/ @ 16/9; Laid, 12/6 @ 13/6.

PRIZE ESSAYS AND TRANSACTIONS

OF

THE HIGHLAND SOCIETY OF SCOTLAND.

CONTENTS.

I. On the dairy husbandry in Holland. By Mr John Mitchell, Merchant, Leith, Page 165

II. On cutting grain-crops with the common scythe, as practised in Aberdeenshire. By the Rev. James Farquharson, of Alford, 186

III. Notice regarding the process of extracting the whey from the curd in making cheese, and description of a new machine for this purpose. By John Robison, Esq. Secretary of the Royal Society of Edinburgh, . 189

IV. Description of a machine for sowing carrots, turnips, and onions. Invented by Mr Daniel M'Naughton, Farmer, Warrix, near Irvine, ... 200

V. Improvements on instruments for bleeding horses, ... 203

1. Mr Cheetham's Improved Phleme, . . 203

2. Mr Cruikshank's Improved Phleme, . 204

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ON THE DAIRY CATTLE OF AYRSHIRE.

By Mr WILLIAM AITON, *Hamilton.*

VARIOUS branches of rural industry have been brought to much greater perfection in particular districts, than they have attained in others. Grain husbandry, and judicious rotations of cropping, form the boast of the eastern districts, and the dairy husbandry in the western parts, of Scotland. A superior breed of horses is imputed to one district, improved cattle to another, and fatted calves to a third. On inquiry, it will be found that most of these peculiarities have proceeded more from active individuals turning their attention to particular branches of industry, and their example being followed, perhaps improved upon, by others, than from soil, climate, or local advantages. There is not, for instance, any local advantage derived by the inhabitants of the parish of Strathaven in Lanarkshire, that can confer a superiority in the feeding of calves, which is not enjoyed in every county of Scotland; and yet calves have been fed in that and some of the neighbouring parishes to a greater degree of fatness and size than in any other part of Scotland, and which have brought a larger profit than has been realized even in the vicinity of London, where veal is sold at a higher price than in any remote district in Scotland. Neither does the superior quality

of Dunlop cheese, or that of the butter-milk made for the Glasgow and Paisley markets, proceed, in the least degree, from a superior quality of soil or local circumstance, but purely from superior management in manufacturing milk into cheese in the one case, and into butter and butter-milk in the other. These improved modes of management might be practised any where, if the farmers and their wives were equally disposed to learn and put them into practice. It must, therefore, be of general importance to make known the advantages that may be derived from a more extended practice of these branches of rural industry, so as to bring them into general use. The present communication is made, in the hopes of showing, beyond all doubt, that dairy husbandry might be greatly extended over the kingdom, to the advantage of the public, and of those who engage in and conduct it properly.

The important art of husbandry has, ever since the days of Cain and Abel, been divided into two leading branches,—the tilling of the ground in order to raise grain and roots for human food, and the feeding of cattle and turning their carcasses and produce to good account. The vegetable productions of the earth form the largest portion of the food of mankind in the adult state; while the milk of cattle is the most wholesome for the young, and for old age, the second childhood. The flesh of cattle is more of the nature of luxury. The rearing and fattening of cattle has therefore always attracted the attention of mankind, while the management of their produce has formed a principal feature in domestic economy.

It is to this subject, or what is commonly termed dairy husbandry, that I wish at present to direct public attention through the medium of this Journal, believing it to be a species of industry, that, though interesting, has not yet been attended to according to its merits,—that has been sneered at by the sages of agriculture, and neglected by many whose interest it is well calculated to promote. Knowing this, and having long paid great attention to dairy husbandry in Britain, and recently on the Continent, I will give a short account of the rise and progress of the Scottish dairy, and of the dairy breed of cattle, and point out how every operation in that branch of agricultural industry can be performed to the greatest advantage. But before

entering on these matters, it may be proper to inquire whether dairy husbandry is of such a trifling nature as to be treated only as an article of pin-money.

The importance of dairy husbandry, and the superior advantages which that branch of industry holds out to the community in general, and to the occupiers of land in particular, are too numerous to permit its being kept in the back ground. Milk, even without the least preparation, forms a ready, natural, palatable, and wholesome article of food. It is indispensably necessary for men and animals in their youth; while, like other articles of food, it is capable of being much improved by skilful cookery and manufacture, so as to suit the taste and add to the comforts of mankind. It would be fortunate for society if a greater portion of milk, and a less quantity of spiritous liquor, were consumed.

The dairy, that is, the manufacture of milk into various kinds of improved food, has long been the most profitable branch of husbandry, and neither the demand for, nor the prices of, that species of agricultural produce, have declined nearly so much as those of grain, and even less than those of butcher-meat.

Land of medium or inferior quality, when occupied by dairy-stock, and only one-third or one-fourth of it in grain-crop at a time, gives a higher rent, makes a better return, and is far more improved by that mode of farming, than it can be by what is termed liberal rotation courses, or even by grazing, or any other way in which land can be occupied on an extensive scale. Land of medium quality is but ill adapted for perpetual cropping, unless when situated near a large town; and even the richest land requires rest occasionally, to renew its vigour, and to make it produce grain of the best quality. But when land is in pasture as often as it is in crop, and the dung made by a dairy-stock applied to the farm, the soil is gradually meliorated, and the quality of the crops it yields is superior to that on land under constant cropping: and when land is kept too long in pasture, it returns to a state of waste. If the occupiers of land in the counties of Ayr, Renfrew, or the lower parts of Lanark, were to be compelled to abandon dairy husbandry for any other system, three-fourths of them would refuse their farms at an abatement of one-fourth part of the rents they now pay, or

would give, if allowed to continue dairy husbandry. Many attempts have been made to establish East Lothian husbandry in Ayrshire, and farmers of eminence have been induced to come from the counties of Haddington, Berwick, and Roxburgh, to the western counties; but few if any of them long continued to practise the agriculture of those celebrated counties. Rotation courses have been tried, to a certain extent, in the western counties, but scarcely ever without a portion of dairy, and yet they have not succeeded, except on a few farms of the best quality, and where town-dung, or other adventitious manure, was within reach.

But whatever be the rotation-course that may be adopted on any farm, or whether many or few cows are kept, it cannot be doubted that, when the cows are of the proper dairy breed, fed as dairy stock, and their produce skilfully manufactured into butter and cheese, that a greater profit will be realized than by either rearing or fattening cattle. This is an important matter to be known and attended to by all who rear or keep cattle of the ox tribe, and therefore it ought to be well ascertained.

It has been stated on the authority of the Board of Agriculture, and upon incontrovertible data, which any farmer or cow-feeder may easily ascertain for his own satisfaction, that the quantity of herbage that will add 112 lb. to the weight of an ox, will, when bestowed on a dairy-cow, of ordinary good breed, and in fair condition to yield milk, enable her to yield about 2700 imperial pints of milk. And, as it is well known that, even in Scotland, where milk often contains more serum than that of cows fed on richer pasture; yet, in general, 17 pints of milk will yield an imperial pound of butter; and the butter-milk will sell at 1d. per three pints; and, as 120 pints of that milk will yield from 16 lb. to 17 lb. avoirdupois, of full milk or Dunlop cheese, it is easy to ascertain whether the 112 lb. of beef, or these quantities of butter and butter-milk, or of cheese, will realize the greatest sum. The 2700 pints of milk will yield nearly 385 pounds, or 27½ stones imperial of full milk cheese; and, if made into butter, they will give nearly 157½ pounds, besides the butter-milk, which would about amount to half the quantity of milk churned. The average price of beef, for seven

years past, has not exceeded 6s. per English stone; and the 112 lb. or 8 stones, of course amounts to L. 2, 8s.; while 27½ stones of cheese, at 5s. per stone, the average price paid by the merchant to the farmer, during the last seven years, amounts to L. 6 : 17 : 6; and the average price of 157½ lb. of butter, at 8d. per lb. for the same period, amounts to L. 5, 5s.; and of the butter-milk to L. 1 : 17 : 6 more, or both to L. 7 : 2 : 6; so that the average price of the cheese exceeds that of the beef to the amount of L. 4 : 9 : 6; and the butter and butter-milk give L. 4 : 14 : 6 more than the beef produced from the same quantity of food to the cattle.

If further evidence were necessary, we have only to compare the rise on the prices of butter and cheese, and of grain, within the last sixty-five years. We will find, that while oat-meal has not advanced more than 50 per cent. on an average during that period, the price of cheese has advanced from 200 to sometimes more than 300 per cent.; and butter from 300 to more than 500 per cent. during the same time. And this increase of price has occurred, although cheese and butter have been imported from Holland to the amount of upwards of L. 815,000 per annum; and the importation of butter from Ireland, and cheese from England into Scotland, amounts to a very large sum every year.

It is true, that it would cost more labour to produce the quantities of butter and cheese which have been mentioned, and with which I have compared them, than the beef; but should the most ample allowances be made for the dairy labour, fuel, &c. there will still remain an overwhelming balance in favour of the dairy over the feeding system. It may also be noticed, that a dairy-cow can be brought to two and a half years of age, when she may be supposed to produce her first calf, at very little more expense than any other cow of similar size and weight can be reared to the same age, and when she is ready for the grazier. And as the dairy-cow lasts and gives milk for seven years, and is then nearly in as good plight for being fattened as the other, the expense of rearing the one is nearly seven times as much as that of the other, in proportion to the time the two cows last *.

* The beef of the cow will certainly be of inferior quality.—Editor.

The greater quantity of rain that falls on the western than on the eastern side of Scotland, is there less favourable for fallowing land, and the other operations of grain husbandry. And the greater growth of grass in the west than in the eastern counties, is more favourable for rearing or feeding cattle. But on that subject it is unnecessary to enter, as the present inquiry is merely, whether rearing and fattening cattle, or keeping a dairy-stock, are the most profitable branches of husbandry: And surely enough has been already stated to decide that point.

The next thing requiring attention of all who wish to study or practise dairy husbandry, is the breed of cows suited to that branch of farming, and the manner in which that species of stock requires to be fed and treated. For it would be folly to expect to render a dairy establishment profitable, unless the cows are not only suited to the purpose, but are also fed and treated in a way to insure a proper return in milk.

Prior to the middle of last century, the cattle of the Bos tribe in Scotland were of two varieties,—the race of Highland cattle, that were reared for the grazier, or to be sent to the English market, and which yielded little more milk than reared their calves; and a sort of half dairy-breed, in the arable districts, which, besides feeding their calves, gave a small quantity of milk for about nine months in the year. Part of that milk was used in the farmers' families, and the overplus was made into butter and cheese. The size of these cows, and the milk they yielded, was in a great measure governed by the quality of the soil on which they were reared and fed, and the mode in which they were treated. Although the making of butter and cheese had become, at a very remote period, the chief boast of the inhabitants of the Bailiary of Cunningham, the northern division of Ayrshire, yet it was not till after the year 1760 that any attempts were made even in that celebrated dairy district to improve the breed of cows, and it was not till after 1785 that any improvement, by bettering the condition of the cattle, was understood, or begun to be reduced to practice.

Many persons yet alive can remember to have seen the dairy-cows in that district of Ayrshire, poor, meagre, ill fed, ill shaped animals, few of whom that were kept by the ordinary farmers were more than from 18 to 24 stones English in weight

when fat, and having all the marks of starvelings. They had long up-standing horns, deep-ringed at their roots. Their appearance was lank,—the chine of their backs bent up in a gibbous form,—their ribs had little curvature,—their skin adhered to their bones,—and their hair was hard and standing on end. They were worse than any cattle now to be seen in any of the arable districts of Scotland, and not superior in size or good shapes to the cattle now in Kintyre, Arran, or in Caithness, and few of them gave more than 3 or 4 Scots pints of milk per day. Indeed, it was impossible that they could be in better plight, as they were scarcely half fed. In summer, the pasture to which they were confined produced more weeds than rich grasses, and it was eaten so bare by sheep that browsed on the same fields with the cows and horses, that the whole stock were merely kept alive. In winter and spring they were fed on oat-straw and what they could gather in the fields, and they got some boiled chaff and light oats after calving. So gradually and imperceptibly were improvements in the breed and condition of the cattle introduced, that although I lived in that part of Ayrshire from 1760 to 1785, and have traversed it every year since, I have difficulty in stating, from my own observation, or what I have learned from others, either the exact period at which improvements began to be made on the dairy-stock of Ayrshire, or the means by which a change so important was begun to be wrought.

The dairy breed of cows in the county of Ayr, now so much and so deservedly esteemed, is not, in their present form, an ancient or indigenous race, but a breed begun to be formed during the memory of living individuals, by some of the inhabitants of the Bailiary of Cunningham, and which have been gradually improving for more than fifty years past, till now that they are brought to a degree of perfection that has never been surpassed as dairy-stock in any part of Britain, or probably in the world. They have increased to double their former size, and they yield about four, and some of them five, times the quantity of milk they did formerly. By greater attention to their breeding and feeding, they have been changed from an ill shaped, puny, mongrel race of cattle, to a fixed and specific breed, of excellent shape, quality, and colour. This change has not been effected by merely expelling one breed and introducing

another, but on the far sounder principles of careful crossing and better feeding.

About the year 1760, or soon after that period, some of the noblemen and great landed proprietors of that county, brought to their seats in Ayrshire a few cows of greater size and better shapes than any of the native stock existing at that period; and these cows, when fed on the rich and sheltered lawns of their new owners, certainly were more productive than the native breed. They were mostly of a dark red colour, with patches of white, and were then said to be Dutch or English cows. I remember to have seen one or two of these stranger cows at Loudon Castle, Eglinton Castle, and one sent to Grougar by Mr John Orr, about the year 1768; and, I understand, that some stranger cows, of improved size and qualities, were about that time brought to Dunlop House. And the Earl of Marchmont having procured from the Bishop of Durham a few cows and a bull of the Teeswater or some other English breed, of a red colour, with irregular patches of white, and kept them some time at his seat in the county of Berwick; Bruce Campbell, then his lordship's factor on the estate of Cessnook in Ayrshire, brought two or more cows and a bull of that breed there, and their progeny spread over part of the country. The bull was afterwards purchased by Mr John Hamilton of Sundrum, near Ayr, and became the sire of several calves on that estate.

These are all the instances of stranger cattle which had been, about that period, brought into the county of Ayr, so far as I knew at the time, or have been since able to trace, on minute and anxious enquiries, I have repeatedly made on the subject; and as I am not aware, that more than a dozen, or at most twenty such cows, ever came into the district, I am disposed to believe, that although they rendered the red colour with white patches fashionable in Ayrshire, they could not have had much effect in changing the breed into their present highly improved condition. While these large cattle were allowed to browse on the lawns near a nobleman's or gentleman's seat, they throve and yielded good returns. But when they or their offspring were turned to the bare pasture, then prevalent on farms, they soon became of less value than the indigenous stock. When cows of larger size than the native cows were coupled with

them, the offspring had large bones and bad shapes and qualities, unless they had been reared and fed on superior pasture, and fodder suited to their size. Coupling large males with inferior jaded cows, in hopes of improving the breed, is one of the greatest errors that can be committed by a breeder of any species of cattle. It was owing to this ill-judged practice, that the diary breed of Ayrshire acquired too much bone for their size, and for the inferior manner in which they were fed; and from the practice of keeping bulls of a large size, the bones of the diary breed are still too prominent. But this evil will probably soon be removed by improved modes of feeding.

It is certainly best to breed from bulls of good shapes, and of a size suited to the cows to which they are put, otherwise their offspring will have large coarse bones, and never will be strong and spirited, in proportion to their size. They will be, in fact, ill-shaped, dull, unhealthy mongrels. The most skilful breeders of dairy-stock in Ayrshire, prefer bulls that have least of a masculine shape, and which have the greatest resemblance to a cow.

The *shapes* that are most approved of in the Ayrshire dairy-stock, are:—*Head* small, but rather long and narrow at the muzzles; the *eye* small, but quick and lively; the *horns* small, clear, bended, and their roots at a considerable distance from each other; *neck* long and slender, tapering towards the head, with little loose skin hanging below; *shoulders* thin; *fore-quarters* light and thin; *hind-quarters* large and capacious; *back* straight, broad behind, and the joints of the chine rather loose and open; *carcass* deep; *pelvis* capacious and wide over the hips, with fleshy buttocks; *tail* long and small; *legs* small and short, with firm joints; *udder* large, broad, and square, stretching forward, and neither fleshy, low hung, nor loose, with large and prominent milk-veins; *teats* short, pointing outwards, and at a considerable distance from each other; the *skin* thin and loose; *hair* soft and woolly; the head, horns, and parts of least value small, and the general figure compact and well proportioned. It is not to be understood that every dairy-cow, or that any one of them, has all these fine shapes. But these are given merely as the perfection of the breed, or the shapes most desired and sought after.

The real dairy breed of cows has extended from the

of Cunningham, first over that of Kyle, the centre division of Ayrshire, the whole county of Renfrew, and the western parishes of the county of Lanark, and are fast extending to many other counties both in Scotland and England. But the dairy cows in the centre of Clydesdale, from Hamilton to Lanark, though of the same colour and general aspect, and remarkably handsome, differ a little in their shapes from the Ayrshire dairy cows. Those in Clydesdale are longer in the body in proportion to their size, rounder in the chest, less capacious over the pelvis, and heavier in their fore-quarters, than the improved dairy breed of Ayrshire. The Clydesdale breed is better suited for the grazier and butcher, than the real Cunningham breed; but, if the opinions of the Ayrshire farmers are correct as to the proper shapes of milch-cows, as I believe they are, those in Clydesdale, though beautiful animals, are not of the genuine dairy breed.

The late Lord Belhaven kept at Wishaw-House, for several years, a fine bull of the dairy breed, a native of the parish of Beith in Ayrshire, but which, though a beautiful animal, was longer and rounder in the body than the generality of the cattle in that parish, and too strong and heavy in the fore-quarters for a dairy bull. But, as that bull got many prizes at the cattle shows in Hamilton, he not only raised a numerous progeny on the banks of the Clyde, but the farmers, believing this bull to be a model of perfection, preferred cattle of his shapes, more than those that are sought after in the county of Ayr.

The *chief qualities* of a dairy-cow are, that she gives a copious draught of milk; that she fattens readily; and turns well out in the shambles. In all these respects combined, the Ayrshire breed excel all others in Scotland, and are probably superior to any in Britain. They certainly yield more milk than any other breed in Europe,—no other breed fatten faster,—and none cut up better in the shambles *,—and the fat is more mixed with the lean flesh, or marbled, as the butchers say, than that of any other breed in Britain. They always turn out better than the most skilful grazier or butcher, who are strangers to the breed, could expect on handling them. They are tame, quiet, and feed at ease, without roaming, breaking over fences, or goring each

* We should doubt of the Ayrshires fattening faster, and cutting up better, than the Short-horns.—EDITOR.

other. They are hardy, and can travel at the rate of from twelve to fifteen miles a day; and they are not injured, but rather improved, by lying out all night during summer and harvest. From their peaceable habits, and the desire they always shew to eat, some have imagined that they are dull and grovelling animals, but they are as lively and spirited as could be wished; and they are seldom affected with disease.

The *size* and *weight* of the dairy cows varies according to circumstances, from about 20 to near 60 stones English when fat, sinking offals. The greatest number of them weigh from 24 to 36 stones. Their prices varying according to circumstances, it is not easy to fix an average. They have been sold from L. 8 or L. 9, to L. 20 and L. 25, and as high as L. 30 and L. 35. Probably from L. 10 to L. 15 may be considered as the average price at present of the best cows; for, like every other species of farm stock and produce, they have sunk in price for some years back.

These cattle are *reared* in a plain, easy, and simple way. The calves are selected from parents of the best shapes and qualities, and few are reared that are not of the fashionable colour, a dark red with patches of white. A good calf may be reared at any season of the year; but those dropped in March or April come at the most convenient time, as they are ready to be put to grass in May, and attain some size before they are turned on fodder.

Calves reared for dairy-stock are never allowed to suckle their dams, but are always fed by the hand from a dish. They generally get from four to five quarts of new milk twice every day, till they are five or six weeks old; when some whey and meal are introduced into their milk, and the milk gradually withdrawn, and finally withheld, when they are from seven to eight weeks old. When reared in winter, the milk has to be continued longer, as a calf cannot eat dry fodder so soon as it can eat new grass. Hay tea, the infusions of pease-straw, linseed beaten into powder, treacle, &c., have been sometimes tried in feeding calves, but none of these expedients have ever come into general use in rearing stock in Ayrshire. But care is always taken to introduce every change of food to young cattle as gradually as possible, as all sudden changes are hurtful.

Dairy-calves get the best pasture on the farm for the first summer, and have some preference to the other cattle during the first winter. But, from that time till they come in milk, they are generally kept on inferior pasture. They are mostly kept in the cow-house during the night in winter. But the better they are fed and treated when young, the sooner will they have calves, and the more likely are they to turn out good milkers. For, whatever may be said about improving the breed, by introducing better bulls, or by the most skilful crossing, it will always be found that it is chiefly, or almost exclusively, by bettering the condition of the cattle, that the most effectual improvement in the stock can be effected. It was not by the charms wrought by the introduction of a dozen or two stranger cows, and a bull or two from England, or from any other country, that the whole race of cattle in three counties have been changed from the worst in the arable districts of Scotland, to the best in Britain. That extraordinary change has been effected in one lifetime, chiefly, or rather almost entirely, by bettering the condition of the cattle—by better feeding and treatment, aided by judicious crossing, chiefly from the same race of animals. Better feeding and management, with reasonable attention to breeding, will raise any race of cows, from the worst to among the best; while crossing ever so much with strange blood, or even a complete change of the stock, will do no good, unless they are well fed when young, and when grown up—when giving milk, or when dry. This has been proved to a demonstration, in the improvement of the Ayrshire breed; and the same thing will happen wherever the conditions of the stock is uniformly improved by better feeding and treatment.

The milk-cows in the dairy district browse in summer on such pasture as the farm affords; and in winter they live on oat-straw, or coarse meadow-hay, with what they can gather in the fields when the weather is temperate; and, by way of luxury, they have chaff or cut-hay, boiled with light oats, green-kale, potatoes, turnips, with some good hay daily after they calve, and till they can be put to grass. But, from the time they are put ... fodder, till they drop their calves, they seldom get any thing .... dry fodder, with what they can gather in the fields. It ... been found that too much boiled meat does not suit cows

in calf; but, surely, a few turnips daily, either boiled with chaff, and given without much moisture, or raw, would not injure them in any condition they can be. On the contrary, a small mess of turnips daily, either entire or boiled, would keep the cows in a milky condition through the winter, and prepare them for giving more copious draughts of milk when they calve, than when they have been fed on dry fodder only the whole winter and spring. Many dairy farmers provide as many turnips as enable them to give every cow a few daily all the time they are on fodder; and a few potatoes when the turnips fail.

Besides these messes, or along with them, the dairy-cows have long been helped to a quantity of oats after calving. No farmer can exactly state the quantity of grain so given to every cow in a season, as some give far more than others. It was found, however, that some of the oats passed through the intestines of the cows entire; and they are now bruised in a mill. Of late, the grain chiefly given to milch cows is bean meal, mixed with boiled chaff and turnips. The quantity so given is generally about a boll of beans made into meal, and divided to each cow in the course of the winter and spring. Some persons give a greater quantity, particularly to cows kept in towns, where they are fed for beef as well as milk.

Wherever the land is enclosed, the cows are turned out to the fields, where they continue in the night time, from Whitsunday till the weather becomes stormy after harvest. Some people who have not fences, and who are too indolent to make them, argue that the cattle are safer from injury in the house at night,—that a sudden change of weather may hurt the cows, or they may break from their encampments and injure the crops,—while they can be supplied in their stalls with provender. On the other hand, when cattle can be kept out day and night, the expense of a herd is saved; they are under no restraint, and are generally more hardy and healthy than when kept in the house in the night time, and the dung is not altogether lost.

Soiling or feeding cows in the house on cut grass in summer, as is generally done in France and Belgium, and in some places in England, is not much practised in the dairy district of Scotland. The land occupied with dairy-stock is not so rich as to

admit of that mode of feeding to any extent. In many places the horses are fed on cut grass in summer; and the second cutting of clover is always carried to the stables and cow-houses.

Farm-stock have long suffered for want of a supply of salt. The high duty on that necessary of the life of mankind and animals long operated as a prohibition to its use among cattle; but even now, when it is removed, many farmers do not avail themselves of the relief. They do not consider that all the domesticated animals have as strong a desire for salt as they themselves feel; and that it acts as a condiment to animals, as well as to the human race. Salt promotes digestion, and improves the pile of horses and cows. The superior quality of the wool of Spanish sheep proceeds chiefly from their being daily supplied with salt. Wild animals run many miles to get a tasting of the salt-springs, when they are within reach; and it is in their neighbourhood that they are the most successfully waylaid and killed. It is not only bad management to deprive cattle of salt, which does them so much good, but it is even cruel to refuse them what they so much desire.

Of the *quantity of milk* yielded by the cows of the Scottish dairy breed it is not easy to speak with precision. There is a great diversity in the milk of cows, which is increased by many circumstances—as the age of the cow—the condition she is in—the nearness to or distance from her calving—and, above all, from the manner in which she is fed. It frequently happens, that, of cows not only of the same breed, but even those which are the offspring of the same parents, fed on the same farm, and in the same manner, the one will yield more milk than the others. Too young or too old cows give less milk than those of middle age. A lean cow never gives so much milk as one in good condition. Cows generally give more milk for a few weeks after they have calved than they do at any other time. The food with which they are fed has a powerful influence on the milking properties of all cows; and the mode in which they are reared has a considerable effect on their milking property. Cows reared on bad pasture and scanty subsistence, will never turn out so good a milker as one reared on better pasture. From these and other circumstances, it is not easy to determine the average quantity of milk given by the dairy-cows.

In my Survey of the county of Ayr, I stated that some of the dairy-cows of that county yielded, for a long time after calving, from 36 to 42 imperial pints of milk per day, but that such returns were not very common. Many of them, however, yield about 30 pints daily when in their best plight, but they gradually fall off as the season advances; and many of them do not yield much more than half that quantity. Probably 3600 pints may nearly be the average quantity of milk cows in that district give in the course of one year.

This statement having been contradicted by a person who resided near the sources of the Clyde, where dairy cows and dairy husbandry are but little known, I was at pains to consult the dairy farmers of Ayrshire anew, when employed by the Board of Agriculture to draw up the chapter on Live-stock, for the General Report on Scottish Husbandry; and I found that, so far from overrating, I had underrated the returns of these cows. I mentioned in that chapter, that the farmers in Ayrshire had convinced me, and that it could be proved, that 48, 54, and in some instances 60, pints had been frequently drawn from these cows daily, for several weeks, when they were in their best plight.

These I mentioned as extraordinary returns. But I added, that if the fact was considered, that several farmers let out the milk of all their cows for a year to people who performed all the labour about the cattle, and in manufacturing the milk into butter and cheese, taking the risk of the market, and paying at the rate of from L. 10 to L. 15, and in some instances more, for each cow's milk per annum, the quantity of milk must have been equal to what I had represented. I therefore concluded, that the average returns of the better sort of the dairy cows, when properly fed and in good plight, would amount to 6000 imperial pints of milk every year; but that inferior cows would not give nearly so much.

Such were the conclusions I came to after consulting the farmers a second time, and to that I still rigidly adhere, against all opposition, from whatever quarter it may proceed. I know that the late Mr Brown at Markle, and others on the east coast, had a prejudice against dairy husbandry, and a districtal vanity, that nothing could be done to good purpose in farming except

othians. But whatever they have said on the subject, ve never been able to controvert the facts I have stated, which I confidently adhere. If I might venture to opinion on their mode of farming, I would say, that cropping of land, even under the most approved courses ion, is bad husbandry, except where adventitious ma- within reach. The earth requires rest, and when that l, the grain it produces is inferior in quality. At any erever cows are kept, they will yield a far greater re- dairy produce, than by either rearing them for the or fattening them for the butcher; and upon these take my stand.

buildings requisite for a dairy-farm, are,—cow-house, ıse, dairy-house, and store for the cheese. Much has ı and written on these subjects, and drawings have often ıde of them to little purpose, as drawings are seldom t when such buildings are to be fitted up. A few re- n dairy buildings may suffice.

houses for dairy-cows ought to be 10 or 12 feet high in walls, with proper apertures in the wall, and no lofts over s, that they may breathe abundance of wholesome air. so large and well-fed as dairy cows, whose lungs are s, ought to have abundance of free air, as breathing of is injurious to them, especially when many of them are ı one cow-house. Cows do not require much heat; so y are kept dry; too much fresh air cannot be given All cow-houses, and the roads into them, ought to be ed and kept clean, as the effluvia of dung or urine can- to injure cattle; and it is a great advantage to cows y be well cleaned and curried with a comb and brush ry day. Where thin flags of stone can be procured, one , about four feet square, should be placed on each side stall, for two cows. An iron rod, called a slider, about s long, should be fixed at both ends in a perpendicular on each side of each flag, so that a cow may be bound slider, by a chain which should slide up and down on er when the cow raises or lowers her head. When n this manner, the cattle are very secure, and have all

the freedom necessary to move and lick themselves. Stone-troughs are now generally placed before the cows to receive their food; and a passage in front for feeding the cows is a great convenience. Every cow-house ought to have a tank or well to receive the urine. I saw nothing in continental husbandry that I would more anxiously wish to see introduced into Scotland, than the careful manner in which the urine of cattle, and every species of dirty water, is carefully preserved and used as manure to the land. The Belgians have not only tanks at their cow-houses for collecting the urine, but they have reservoirs on different parts of their farms, to which it is removed as collected, and kept in them, excluded from the air, till it be convenient to be sprinkled upon the ground, which is generally done a few days before sowing the seed for a crop.

A *milk-house* should be so large as to contain at least one day's milk of all the cows kept on the farm; and still larger if butter and skim milk cheese are made. It should be placed, if possible, under the shade of trees or high buildings, that it may be screened from the sun; and it should not be roofed with slates or tiles, but with thatch and turf, in order to exclude the heat in summer and the cold in winter. The height of the milk-house should be at least 12 feet from the floor to the ceiling, and it should be laid with polished and neatly jointed pavement, and the joints should be filled up with Roman cement, or other similar material, so that no milk or dirty water may lodge in them, and communicate a bad smell to the house and milk. A window for light should be on the north side of the house, that the sun's rays may not enter; and it should have two ventilators covered with brass-wire and gauze-cloth to keep out mice and exclude flies. The inside of the milk-house should always be kept dry, cool, free from damp, and well ventilated; and in very hot weather it may be washed in the inside to keep it cool. No gutters for dirty water should communicate near it, nor any docks, nettles, or filthy herbage allowed to grow near it to create a stagnation of air. The milk-house should be near to the cow-house for convenience, yet so distant, that neither the breath of the cattle nor the effluvia from the cow-house may reach the milk. The house and every thing in or connected with it, should be at all times kept as clean as can be by human hands. I was de-

lighted with the cleanliness in which the Dutch milk-houses and every thing about their dairies were kept.

The *dairy-house* must be near to the milk-house, and yet so constructed that the steam of the boiler or effluvia from the house may not reach the milk-house. This apartment should also be well paved, and the floor and every thing in the house kept clean, as cleanliness is above all things necessary in every thing connected with the dairy. If the milk-house and dairy-house are distant from the cow-house, or from each other, a roofed passage should run between them, as the milk is readily injured by the rays of the sun, by rain, or by exposure to the air.

A *store-house* is necessary in all large dairies, and it ought to have little light, a moderate current of air, and be free from dampness, but not too dry. A ground-story of a house suits cheeses better than an upper floor or a garret. Cheeses in Scotland are not sweated as in England, nor greased and scraped every week or two as in Holland, but merely kept in a store-room, resembling a barn as to light and heat, but not so airy. The dairy implements will be described under the different operations of cheese and butter-making.

REMARKS ON THE REVERSION OF WHEAT INTO GRASS.

By Mr MAIN, Chelsea.

I BEG to offer a few remarks on the "Reversion of wheat into grass," as stated in a paper by Mr W. Blackadder in the December Number of your Journal. Mr Blackadder's supposition is not new. If I mistake not, one of the earliest writers on agriculture,—Columella or Pliny, I forget which,—conceived that the original type of our cultivated wheat was the *Bromus mollis*, soft brome-grass; and I have met with an old farmer in the county of Hertford, who was of opinion, that light winnowings of wheat if used for seed, become changed into ray *(Bromus secalinus)* and darnel *(Lolium temulentum.)*

That there should be various opinions respecting the original type of wheat is not at all wonderful; because, unlike many other cultivated plants, no trace of it in a wild state is any

where to be met with—not even in its native country, Egypt. It is perfectly true, that the sorts cultivated in the northern and alpine regions of India, are far inferior to the varieties cultivated in Europe—more, indeed, like rye than wheat. Still, even there, wild wheat is not found. But this, I think, may be easily accounted for. No plant requires the protection of man more than wheat; it is not only *his* "staff of life;" it is equally coveted by every granivorous bird and every grazing beast, whether in its green or in its mature state. It is seldom we see the scattered grains arrive at perfection in our lanes or hedges; and if a plant springs up in the latter situation and comes to maturity, the increase is quickly devoured either by birds or mice. In fact, the protection of the rick-yard, barn, and granary, is absolutely necessary for the preservation of wheat for the use of man. With respect to the opinion of the Hertfordshire farmer, his mistake (as it certainly was) is easily accounted for. If either ray or darnel grew in his wheat—and few crops can be seen entirely free from one or other—their seeds would most likely remain with the lightest portion of the bulk; and if this inferior sample were, through penuriousness, chosen for seed, a great share of the succeeding crop would certainly be ray or darnel, or both; confirming the blind and careless cultivator, that his "swans had become geese." But whether such a transformation, as that of wheat into any of these grasses, can in any way take place is the question.

In viewing the whole vegetable kingdom, we observe genera, species, varieties and subvarieties; the last carried out, in many cases, beyond all appreciable limits. The types of many genera are no more like the varieties obtained from them by high cultivation, than if they were totally distinct and different beings. For instance, the sloe and the magnum-bonum plum; the gean and Knight's black-heart cherry; the crab of the hedge, and the monstrous rennet apple. Among herbs, compare the wild with the drumhead cabbage; the wild with the Altringham carrot; and the perennial ryegrass with Pacey's variety of the same. Botanists enumerate near thirty species of wheat, and some hundreds of varieties; but not one of these can be fixed on as being the type of the summer and winter sorts now in cultivation; both being, in all probability, only varieties. Taking into consideration the difference of structure and qua-

lities exemplified in the cultivated varieties alluded to, we only see an *amplification of parts*. In some the roots and stem are enlarged, as asparagus; in others the number and size of foliage and flowers, as cauliflowers and cabbage; some have the integuments of the seeds enlarged, as the apple; others the seeds themselves, as the cob-nut, and the Windsor bean. In all these changes, however, increase of volume is the most striking characteristic of variety. There is no change of *generic character*, or of constitutional organization; and therefore we are led to conclude, that no genus is capable of being transformed into another.

None of the natural orders of plants bear a stronger resemblance to each other than do the 158 genera composing *Gramineæ*; viewing them from the *Bambusa arundinacea*, a tree grass, down to *Aira humilis*, the least hair-grass on Mount Caucasus, a strong likeness runs throughout. Notwithstanding this general similitude, every genus is distinctly marked both physically and botanically; and there appears not the least likelihood that they are amalgamable into each other or changeable in any other way than as is remarked above. We have, it is true, instances of vegetable mules, that is, intermediate productions between two species partaking of some semblance of both parents; but these instances are not only extremely rare, but the progeny, like animal mules, are imperfect in reproductive functions, and quickly cease to exist. Florists' mules, obtained by cross impregnation among kindred varieties, show changes of habit or colours only, not changes of generic character.

Applying the foregoing observations to the circumstances detailed by Mr Blackadder, I would infer, that there has been some mistake in the instances cited. That the *giant-fescue* appeared on the spot where the smutted wheat was deposited, there can be no doubt; but that this grass sprung from *dead* grains of wheat is perplexing. Smutted ears or grains of wheat, barley, or oats, never flower, and consequently cannot be fertile. The smutted grain of wheat, however, when mixed in

What is here taken for granted, namely, that smutted grains of wheat never flower, and cannot therefore be fertile, constitutes, we conceive, the [illegible] essence of the question "Whether such a transformation can in *any* way [illegible] EDITOR.

the bulk, are nearly of the same size as those of darnel, and might be easily mistaken the one for the other; and thus, I dare say, it has happened in the trials of Messrs Strachan and Bell.

Both the ray and darnel require to be sown in the autumn, in order to their flowering in the following summer. The first yields a heavy crop of seed of excellent quality, relished by every bird and beast; the second has a long spike of large seeds, in flavour as bitter as gall, and in quality intoxicating, and even dangerous if ground in bread corn or mashed in distilleries. This is like the *sleepies* mentioned by Mr Blackadder.

Being at a meeting of the Linnean Society a fortnight ago, I mentioned the circumstance of the "reversion of wheat into grass," to Messrs David and George Don; they both agreed with me in thinking that the seeds of the *fescue* or *brome* had been *unintentionally* sown with the smutted grains of wheat.

ON THE UNPROFITABLENESS OF OLD PASTURE COMPARED WITH NEW. *By JOHN BOSWELL, Esq. of Kingcausie, Aberdeenshire.*

I HAVE long held the opinion, that "permanent pasture," instead of being a good thing, is an erroneous thing—I had almost said, an absurd thing—into which the agriculturists of this country have fallen; and it has only been the idea, that, in this age, when the science of agriculture is making such rapid strides, when men of the highest caliber of intellect are putting forth their talents in removing darkness and error from the art,—some one would step forward and expose the fallacy of *permanent pasture* being such a grand and desirable object, that has deterred me from expressing my sentiments on the subject. No one having taken it up, I am constrained to do so. I shall, however, only endeavour to break the ice, and leave it to more able pens than mine, to bring the matter as fully as it deserves to be before the public. As I am about to advance a doctrine quite hostile to the received opinions of many sages in agriculture, I think it right at once to state, that I conceive *pasture* to be of vital importance to agriculture, and the production of it in

perfection, a sure sign that a man is at the top of the tree in his business as an agriculturist; and I may also state, lest I should be accused of too hastily taking up a theory which I have not studied, that although agriculture, *in all its branches*, has been my pursuit for many years, the production of good grass was the first thing which induced me to enter on it, and was for a long period the philosopher's stone I sought most eagerly to find out. Struck, when a boy, with delight at the evergreen meadows of Doncaster, and the freshness, in the dead of winter, of the fields near London, I could not, in settling in the north, help contrasting these—with a feeling almost bordering on disgust—with our whitey-brown *grass parks* of Scotland, wearing n many places a pale blue tint till the beginning of June, or puffed off with great exultation in the newspapers, as affording "a full bite" in the middle of May. I said to myself, "Cannot industry and exertion produce a change on our grass lands? Perhaps we cannot expect to vie with Doncaster or London, but still something may be done." So, doffing the gay soldier's coat, and putting on the hodden grey, I set to work, to try if fine pasture could not be got in Scotland. Long did I toil at top-dressing—all the never-failing oft-recommended recipes of this compound and that compound, I tried in vain—peat-earth, in all the varied shapes of mixture with lime and dung; soot; composts with scrapings of ditches "or other matter"—all these I tried in various ways. I exhausted the pharmacopœia of agricultural quacks; but soon found out that without the aid of plough and harrow nothing could be done—in other words, that the ground must be put in *good heart* before you can have *good grass*.

Well, that being done, I had fine grass; but it grew bad again; it was not *fine permanent pasture*. I had once more recourse to the old system of top-dressing, and of course improved the pasture, but again it fell off.

By this time I had before my eyes the palpable fact, that new laid-down grass was good, and that, do what I would, old grass could not be made to bring the same rent. My love for permanent pasture was now shaken—I began to be awake to the folly of wasting time and money in top-dressing, when a good and profitable corn-crop would cause the same land to carry fine grass, and bring a much greater rent. I now ventured to hint

to some of my friends, that breaking up the ground appeared to me a much more easy way of producing good grass, than all the composts that could be put on. Few would even listen to me, and I was brought up with an exclamation, "Oh, I assure you, there is nothing like fine old grass, it is so close in the bottom, it has so much more nourishment in it," and such-like oft-repeated and firmly-believed humbug. This opposition has led me deeply to consider the matter, and to look out for facts, some of which I shall adduce.

It appears to me, that it is only on certain soils and situations, that pasture can be allowed to remain without great loss; that such situations are flat meadows, or the neighbourhood of rivers or streams, rich in alluvial soil, and the natural habitat of the pasture-plants, or in the vicinity of large towns, where manure has been applied till the ground could not bring a grain-crop to maturity; and that on all other situations, recourse must be had to the plough, so soon as a failure in the grass-crop takes place; and the breaking up will entirely depend on the quality of the land and manner in which it has been treated, there being no such true *unerring* guide to the *quality* of land, as the length of time it can profitably be left in pasture. If permanent pasture be the object, I would earnestly recommend to all and sundry the careful perusal of, and strict adherence to, the rules laid down in Mr Smith of Deanston's admirable paper on frequent draining and subsoil ploughing, in the pamphlet published by Messrs Drummond, nurserymen at Stirling, being firmly convinced, that implicitly following his advice will be the first step towards making land capable of remaining any length of time in good pasture; for it is altogether impossible, that, without draining and deep ploughing, good grass can be produced. Little need be said on the unprofitableness of old pasture to the actual farmer. There is little old grass to be found on the farm of a man who has rent to pay; but to the amateur, who may not be quite so much alive to the loss he sustains, I would ask, Have you never remarked the difference of rent that is given by a grazier or butcher, for a field of new and a field of old grass? Have you ever put the question to yourself, Why is this? I shall give you the answer: Let both fields be shut up and cut for hay, weigh the produce, see the

great difference in favour of the new grass, and the secret is out. Still keep the cattle from the fields; look at the new grass, how soon the aftermath springs! Well, then, is not the overplus of the hay that which would have fed so many more cattle? and yet people prate about old grass. But some will say, 'That is very well for profit, but we want beauty; you have no close bottom in your new grass. I answer, put the ground under a good rotation, drain it well, plough it deep, and when you have it ready, apply to Mr Lawson, the well-known and enterprising seedsman to the Highland Society of Scotland; tell him the nature of your soil, and I answer for it, he will send you such "a mixture" as will produce you a green carpet the very first year that no Genoa velvet could surpass.

I would here digress a little, to say a little to those who may, for the first time, wish to sow the native grasses. Do not send to London for them. I have tried both, and found them quite as good, and many per cents. cheaper, when furnished by Mr Lawson; besides—some of the first men in England appear to be utterly ignorant of what they ought to send. On one occasion, some years ago, I desired a seedsman of first-rate celebrity in London, to send me such and such seeds, in what quantity *he* thought would be sufficient to sow ten acres. To my astonishment I received an invoice of seed enough to sow the whole parish!

But to return. Not only is the produce of an acre of new grass far greater than that of an acre of old, but it is more palatable to the cattle, and, as far as I have been able to observe, exactly in the ratio of the age of the grass. An example of this came lately under my eye: A tradesman occupied a field, which he cultivated regularly—breaking up a bit, green-cropping it the following year, and then sowing it down, after which he pastured it by tethering his beasts. The man leaving the place, I caused some hurdles to be put round the bit not in grass, and let the rest of the field in pasture. The cattle, during the whole of summer, ate the new grass to the very earth, and did not taste the older, until the force of hunger made them do so. Next season, the bit which had been hurdled off was sown out, and allowed to go with the rest of the field. The very same thing took place—the new grass was first eaten, and then that which was older. I had an opportunity last summer of obser-

ving the marked preference which sheep give to younger grass, compared with old, by putting cattle into two fields, separated by a fence only,—one very fine grass of some years' standing, the other only three years old, and, pulling out some of the lower rails of a communicating gate, permitted forty sheep to pass through, and pasture in whichever field they pleased. The result was, they were constantly to be found in the field of younger grass, and very seldom went into the old grass enclosure. At last I was forced to shut them into the old grass, finding they were reducing the feed in the one, and leaving too much in the other. Be it always remembered, that land must be well laid down. If grass, however new, be growing on poor land, or wet, or on land that has been badly cleaned, cattle do not relish it. I have seen frequent instances of this. More particularly do they dislike pasturing on foul land.

I have several times allowed small farmers—or crofters, as they are called—to put the whole of their last year's manure on the bit of ground that ought to have been made into green crop —had they not been quitting their possessions—under the promise that they would give it one or two extra ploughings and harrowings, and sow it down with grass-seeds. This bit of ground, although well dunged, and sown with good grass-seeds, having only got a sham of a cleaning, was of course full of knot-grass, couch, and other weeds. I have observed that cattle constantly shun it, although almost pinched with hunger.

I have now endeavoured to prove that new grass is not only of greater value, but that it is also more palatable to cattle. There is yet another point in which new grass excels old, and that is the early verdure in spring, and the long continuance of that verdure in the fall of the year. I was once greatly struck with this on the lawn of a highly valued friend of mine, who farms pretty largely, and who spares neither trouble nor expense to procure fine grass round his house. This gentleman had applied all sorts of compounds, in large quantities, as top-dressing to his lawn, particularly gypsum, rich earth, &c., and, by means of these, had grass much superior to what is generally to be seen in spring; but it so happened, that having made some alteration on his house the preceding summer, the workmen had destroyed a portion of the grass on one side of the house, and

my friend had been forced to dig this part over, and to sow it afresh. He was well acquainted with the value of the natural grasses, and a mixture of them had been used. The consequence was, that early in April, when we were looking at it, there was a little bit of most beautiful grass, far before the rest of the lawn in verdure and earliness. I called the attention of my friend to the verdure of this patch, and to the advantage of renewing the grass on the rest of the lawn by digging it up. He could not help admitting the superior verdure of the part that was dug,—it was, indeed, too evident to deny; but, on my endeavouring to point out to him that he might have all his lawn just as green, if he would break it up, he shook his head, and said that was a serious concern—he did not know about that. With such-like answers, and with proof daily before his eyes, the lawn remains just as it was.

I had frequently heard of some fine old pasture at the seat of a nobleman in the county of ———, which had never been seen under the plough, not even by that venerable personage—"the oldest inhabitant of the place." The first week of July last, I went to see this wonderful old pasture. What was my astonishment, to find a large tract of very fine land covered with *white grass*, the green tinge of spring hardly taking any thing from the bleached appearance of the ground. Instead of a green prairie alive with stock, finding at that season of the year ample food, a few deer (which I learned had been brought through the winter at a great expense of hay and turnips, carted in for them), and half a dozen of horses, picking a scanty subsistence, were the whole stock a park of noble extent could keep!

On conversing with the land-steward, he informed me that it was so old, and the grass, in consequence, so long of rising in spring, it was proposed to break it up, in order, as he said, "to renew the grass."

I am fully aware, that in the front of villas, or around the castles of our nobility, it would not answer to have a three-shift course,—"white, green, white;" and that the ground, in such situations, must remain in grass, like old plate on the sideboard, the bullion in the one case, and the soil in the other, being locked up as to use, and destined to perform a part in the pa-

t and circumstance of rank, until some spendthrift heir

send them both a whirling round the wheel of utility. But if there is to be grass land in front of the castle or the villa, why should it not be the best? His Lordship would be ashamed to have tarnished plate; why should he have yellow grass? I see no reason why the one may not be in as good a state as the other. I take it for granted, that the man, whoever he may be, who *condemns* his ground to *permanent pasture*, is regardless of money; and that he would willingly bestow any sum on top-dressing, to have that pasture *good*:—well, then, dig over the ground, and give one quarter of the manure which would have been employed in top-dressing; send for "Lawson's lawn mixture;" and, in a shorter space of time than the ground would have been ugly and brown under the top-dressing system, the most beautiful verdure will be produced—to say nothing of the employment of several industrious men, who would thereby be enabled to earn an honest livelihood for themselves and their families. Of course, this spade-work I only prescribe, when time is not allowed to put the ground through a regular rotation. I would only apply to the spade, where there is no more time allowed to procure good grass, than the same piece of ground would remain brown if top-dressed.

I have frequently urged different persons to try a part, say a half or a quarter of a lawn—that is, while they were top-dressing the one part, to dig up the other, and to judge for themselves the truth of my assertions. I recollect one instance, where I gave this advice to a gentleman who resides near Edinburgh. I was calling on business; and on gaining admission into his premises, I found, in front of a very pretty villa, a lawn, situated in the best climate in Scotland, and where manure was to be found in any quantity, covered over with lime, through which appeared the nap of a thick blanketing of coarse yellow moss. I could not not help asking the gentleman why his lawn was in this state. "Oh," he replied, "I have been advised to put on the lime to kill the moss, or fog as it is called; for, in truth, there is nothing grows on it but that abominable moss, and yellow dandelion, and I think of putting some earth on the top of the lime, and sowing some grass-seeds." I volunteered my earnest counsel to try what digging up would produce on a part at least, gave him a recipe as to grass-seeds, and without a

fee, made my *congé*, the gentleman promising to follow my advice, which if he did, I felt assured would soon induce him to dig up the remaining part.

Perhaps grass might be produced at once, where the ground is not encumbered with trees, and all other circumstances are favourable, by means of trench-ploughing—I mean by two ploughs following one another: the first would take as thin a slice as possible, which would be thrown into the open furrow; the next plough would follow on exactly the same ground, and bring up some fresh soil to the surface, which would be laid on the top of the first furrow. The ploughing being finished, a little short dung, such as is collected by the police, might be thrown on the surface, and harrowed in along with grass-seeds. In situations at a great distance from dung, bone-dust or pounded rape-cake could be used, to cause the braird of the grass to come away.

Having now broached this subject, I would not, for the present at least, pursue it any further; but ere I take my leave, I would, in the first place, state, in corroboration of what I have been endeavouring to maintain, that by following the breaking-up system instead of the top-dressing one, I have not only altered the verdure, but I have increased the rent of the old grass-lawn on my farm at Balmuto, in Fifeshire, from three to five fold. In conclusion, I would make a brief recapitulation of my sentiments: I maintain, that except a few favoured spots, such as banks of rivers, &c., no ground can, without loss, be left long in pasture; that it appears to me, four or five years is, generally speaking, the longest period land should be allowed to lie in grass; that if pasture be the object, at the end of that time, the ground should be broken up, and returned to grass again. I maintain, that *without grass*, severely cropped land cannot be restored to full fertility; and *without cropping*, grass cannot be made to continue at the maximum point of verdure and utility. Lastly, I maintain no land, under any circumstances, ought ever to cut in hay, if intended to remain some years in pasture; and that as a rule, every kind of land ought to be directly after cropped, and again put through the rotation.

ON COTTAGERS' GARDEN SOCIETIES. *By JAMES STUART MENTEATH, Esq. Younger of Closeburn Hall.*

FEW employments are more useful or more amusing than gardening. While it ornaments the country with a variety of beautiful plants, it may be made the means of contributing to the comfort and sustenance of numbers, by an abundant supply of vegetables.

It is somewhat extraordinary that in Scotland, a country which supplies England with some of her best gardeners, the labouring population should be so little acquainted with the culture of the garden. We need not be surprised at the disappointment which the English traveller feels, when passing through Scotland, in observing the garden ground attached to the cottage generally neglected and ill cultivated, and often overgrown with weeds and useless plants. We can hardly tell, from this neglected state of the cottage-garden, how it should come that Scotch gardeners are so frequently found in the employment of the richer classes in England.

To remove all grounds for such remarks on Scotch cottage-gardening, and to spread among the labouring people of Scotland a taste for this most useful art, the following hints are suggested.

In almost all professions we observe, that the members of them, in order to advance their skill and acquaintance with the art they are pursuing, form themselves into societies; and to stimulate each other in their progress, rewards are fixed and distributed among the most deserving.

Ploughing matches, and horticultural societies, as every one knows, have done much to improve the skill, dexterity, and intelligence of the ploughman, and the gardeners of the landed proprietors.

With this view we propose that a Gardening Society, solely confined to the labourers of one or more parishes of any district, should be formed: That rules and regulations be drawn out for regulating the concerns of such a society: That regular meetings at different periods of the year should be held, at each

of which there should be exhibitions of the produce of the gardens of the different members: That prizes should be awarded to the exhibitors of the best fruits, herbs, roots, and vegetables, and perhaps of the more ordinary kinds of flowers: That a list of the competitors for the prizes should be published some time before the meetings of the society; and, to afford general satisfaction, that the choice of the judges should be left to the competitors: That bee husbandry be encouraged, by rewarding those who raise the greatest quantity of honey: That prizes of the following nature be distributed,—money, packets of seeds, each packet containing an assortment of all the useful kitchen garden seeds, with a few flower-seeds, garden tools, and a few useful short works on common kitchen gardening: That the smallest annual subscription from each member be received: That an account of each of the meetings be drawn out, with the list of the names of the successful parties, and be inserted in one of the county newspapers.

The society should annually purchase a quantity of the best kitchen-garden vegetable seed, and re-sell it at a reduced rate to its members, in such proportions as each of their small gardens require.

Landed proprietors in the neighbourhood should be solicited to aid the usefulness of the society, by sending for distribution among its members, hardy evergreens, cuttings, and seeds of useful and ornamental plants; and in order particularly to encourage the children of the members of the society in the same taste, prizes should be given to such children as have produced, at the meetings, flowers cultivated by their own hands in their little gardens.

The advantage of such a Cottage Garden Society must be so apparent to all as scarcely to demand specification.

Among the chief advantages would be that of fostering a general spirit of gardening throughout the district. By giving prizes at the several meetings within the year, deserving and meritorious members' exertions would be publicly known, and their praiseworthy industry be rewarded in the presence of their fellows.

Many of the members—as several of the prizes would consist of packets of seeds, consisting of the most useful common kitchen

vegetables,—would have at command, for sowing their gardens, the proper seed; and those who are not successful in obtaining prizes, might, at a reduced price, purchase from the society such vegetable seeds as they wanted.

The society, also, having at its disposal, by the liberality of the landed proprietors in the neighbourhood presenting them for distribution, hardy evergreens, cuttings, and seeds of useful plants, would give these away among its members.

The last, though not least, of the benefit of such a society, would be the ample increased supply of wholesome garden vegetables, for the use of the cottager's family, of his pig, and of his cow. And in addition to this, by the increasing interest the labourer would take in cultivating his garden, his health and comfort would be vastly augmented.

The skill and intelligence of all being thus promoted, the best method of raising the greatest possible quantity of garden produce on a given piece of ground would be discovered. Some useful and valuable varieties of culinary vegetables, unknown and uncultivated in a parish, would be introduced. Such a society would also be a little seminary, where many an intelligent young man, learning the rudiments of gardening, would be qualifying himself to become a paid apprentice, a journeyman, and ultimately to manage the garden of a nurseryman or of some landed proprietor.

The landed proprietor, while witnessing the increased zeal and laborious efforts of the cottagers to cultivate their gardens, to obtain the prizes offered at the different exhibitions, could not fail to view them with the liveliest interest. His support and kindness to the cottagers would be rewarded on their part by the most grateful feelings; and thus the links of society, now too far apart, would be drawn closer and closer.

In short, the success of such a parish Garden Society as is just pointed out, would to some extent be a triumph of knowledge over ignorance; of virtue over vice; of happiness over misery; and instead of the cottager indulging in sloth and drunkenness, we might hope to see his leisure hours spent in his garden: that his pleasure would be in the society of his wife and children; and his anxiety be, that they should share with him in all the domestic comforts that could be afforded by l
garden.

To shew more fully than any reasoning can do, the good effect of such an institution, it may be mentioned that a society, nearly of the same kind, has existed for several years in the Glenkens of Galloway, formed, we believe, under the direction of Mr Grierson of Garroch. The effects in that quarter have already been remarkable, in improving the appearance and comfort of the cottages, and in bettering the habits of the labouring classes.

Were these Garden Societies once established in separate parishes, a number of them might be united in one district, into a larger Garden Society, as has been done in that of the Glenkens Society, and prizes of a larger amount be distributed among the successful competitors belonging to it.

ON GREENHOUSES. *By Mr* TOWERS, *Author of the Domestic Gardener's Manual, C. M. H. S.*

GARDENING, as well ornamental as useful, is a subject which never fails to attract the attention, and gratify the taste, of every one who spends a portion of his time in the country. To be without a garden in the country, is to be without that object from which the family of the country gentleman derives the greatest portion of their enjoyment. The ladies in particular are delighted with the attractive beauties of the flower-garden and the greenhouse. Probably many of them who possess fine specimens of beautiful plants from foreign climes, have not acquired, but may desire to acquire, plain and concise rules for their proper management during the various seasons of the year; whilst others may be deterred from constructing greenhouses, from an erroneous estimate concerning the attention which is requisite for the successful culture of the plants. Whilst the pages of this Journal afford ample materials of contemplation in the scientific and practical agriculture of the fields, to the stronger lords of the creation; it is only prudent and certainly agreeable to gratify and encourage the prevailing taste of the gay and fair daughters of Eve, in the light and ornamental productions of the garden.

With this laudable object in view, I propose to commence a series of papers on gardening, with the Greenhouse and its in-

mates. I shall, in the first place, describe the various kinds of structures which are capable of preserving ordinary greenhouse plants in safety throughout the rigours of winter; and then shall give a concise but distinct account of the botanical characters and habits of every plant which I shall judge most likely to become objects of general interest. These characters will have reference both to the Linnæan and what is called the Natural Arrangement. By adding precise directions in regard to the soil,—watering,—exposure to the sun and air, and pointing out a method by which a variety of beautiful species of plants may be cultivated with success in the windows of the parlour or the drawing-room, I hope I may be able to contribute to the gratification and instruction of the most estimable, and most inestimable portion too, of society.

By the term *greenhouse*, gardeners generally mean to designate a structure of brick-work, timber, and glass, of sufficient extent, in breadth, length, and height, to secure the protection of several hundreds of plants in pots throughout the winter, many of which may be supposed to grow to the height of from three to six feet. A greenhouse of this rank is an object of great ornament, and proportionate outlay. But I do not intend to confine my observation to structures of so much elegance; but to include every structure in which plants of a medium hardihood of constitution can be preserved in safety and health, from that of the under ground glazed pit, to the modern and superb curvilinear structure, with its light and airy framework of cast-iron. As many persons also delight in plants of ornament who can command no structure at all, I shall point out a method by which they may indulge their taste at little cost. By the term *greenhouse plant* is to be understood, at least in the sense which it will be the object of these papers to assign to it, any herbaceous, bulbous, or shrubby plant, which cannot support, without injury or destruction, a state of actual frost, for more than twenty-four hours. As 32°, indicated by the thermometer of Fahrenheit, is what is called the freezing point, such plants cannot survive in a healthy state, without very considerable coverings, in the open air; and though with such protection life may be maintained in them, they become unsight-

ly things in a garden laid out for ornament. They cause, besides, a considerable degree of trouble; since, whatever excludes light, and is liable to become thoroughly damp, ought to be removed on every amelioration of the weather. While speaking of the subject of the temperature, it is worthy of remark, that the thermometer very frequently indicates a degree much below 32°, at an elevation of five or six feet above the surface of the ground, at a time when no hoar-frost appears, and but little danger is incurred from the frost; and the reverse of this is equally true. I have noticed in former years, the thermometer to stand at from 36° to 42° in the shade, when the herbage was covered with hoar-frost. On the other hand, during the course of the present autumn, I have seen six or eight periods when a degree of frost from 31° to 26° has been evinced by the thermometer, without any corresponding appearances or effects being indicated by the herbage or tender plants. On one occasion, and one only, the frost acted decisively on vegetation; it killed, as if by fire, all the tender *Salvias* and *Celsias*, in the space of perhaps six hours. Nevertheless its effects were very limited, about this neighbourhood at least (Berkshire); for all my young geraniums that I chose to leave abroad were safe and uninjured; the chrysanthemums were in perfect bloom, and the *leaves* remained firm upon several young apple-trees. These anomalies in the effects of frost ought to be carefully studied; they evince a great irregularity in the attracting surface, and none of the theories of *latent* or of *radiating* heat can satisfactorily account for such anomalous phenomena. The plants which require protection then, are all such as will *live* at 34° or 35°, *retain* their general healthy green appearance at 40°, and tend *to grow* at and above 48° Fahrenheit.

The greenhouses of large establishments are almost invariably under the management of a head-gardener and his assistants. With their management, I interfere not. But where a country gentleman's family wishes to have a single house, for the security of plants, the culture of which is to be under the superintendence of the members of the family, I would earnestly recommend, that the greenhouse be, if possible, close, if not adjoining, to the dwelling-house; for where the female branches of the family intend to superintend the arrangements, there should

be as little out of door work as possible during the winter season. To obtain this desirable arrangement, the greenhouse ought to have a communication with one of the sitting rooms, and its fire-place should be under cover. If the structure is curvilinear, it would add little to the expense to heat the house by a simple hot-water apparatus; and it could be so contrived by an able engineer, as to have its boiler an object of utility, and perhaps ornament in the economy of the dwelling. Where a moderate outlay is of little importance, the work cannot be too well done, nor too carefully finished. The hot-water apparatus could be made to afford radiating heat sufficient to maintain 45° or 50° during a period of at least 10° or 15° of frost, especially if a covering of oiled canvass were drawn over the glazed roof every very cold night.

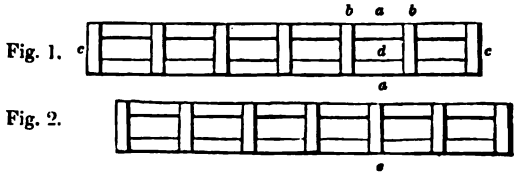
In summer, during bright sunshine, the glare of light in such houses is so intense, that plants are very apt to be scorched; it would therefore be advantageous to substitute a blind of linen cloth of an open texture, for the stout winter covering, to act as a screen during the mid-day sun.

Very handsome structures may be formed by adopting the old mode of building, and which Mr Loudon designates the "clumsy shed-like" greenhouse. A house with the simple sloping roof of wood work, may be made both light and airy, if not graceful, provided the astragals of the sashes are made very thin, and the slope of the sashes laid at an angle of not less than 35°. Such a slope is indeed almost indispensable, as, if the angle be less, the laps of the glasses are apt to retain water, and cause a drip during rain.

It is astonishing at how trifling a comparative expense a greenhouse or good glazed pit may be constructed, provided there be a tact for works of masonry and carpentry in the master of a family. A few pounds will, as I have reason to know, finish off, and sometimes very well too, a house that, were regular builders employed to construct it, would cost L. 60 or L. 70. This hint is worthy of being attended to by country gentlemen. A greenhouse, whatever may be its materials and structure, whether it be curvilinear, and of metal or of wood, with a lean-to roof, or glazed on three of its sides, so as to command a

north, south, and eastern exposure, ought to be at least fifteen feet long, ten or twelve feet high at the back, or in the centre, and its breadth not less. It should have a brick wall around it of nine inches in thickness, the height of which can only be determined by the situation and form of the house; but I would recommend that the cellular mode of laying the bricks be adopted, for a great saving of materials is thereby not only insured, but a plate of air is interposed between two brick surfaces, which tends to preserve uniformity of temperature, and some degree of warmth within the house. The bricks are laid on edge, two and two, forming the front and back of the wall, with a third one also on edge crossing the end of each pair. One course being thus finished, the course above it is made to break joint with the one below, by laying each pair of bricks so as their centres may rest upon the centres of the cross brick on edge of the course below it. Bond is thus secured, and a space formed between the pairs, equal to the difference of the sum of the two bricks on edge, and the length of the one that crosses the ends of the two. Supposing the length of a brick to be nine inches, and its thickness three inches, there will be three inches of space left between the bricks. The alternate ranges of the brick-work thus constructed will render the wall cellular, and strength and lightness will be combined.

I subjoin a sketch of a portion of two courses of a cellular wall, by which, if the one be supposed to rest upon the other, it will be apparent that each joint alternates with the one below it; and that the cells range throughout in a sidelong oblique direction.



a, Fig. 1. are two bricks set on edge forming the back and front of the wall *c c*; *b b* are the two bricks also on edge set across the wall at the ends of *a a*; *d* is the space between the bricks three inches in width. Fig. 2. is of exactly the same

construction as Fig. 1, and if it were placed on *cc* so as the cross edge brick *e*, Fig. 2, were placed in the middle between the two cross edge bricks *bb*, Fig. 1, then the interior of the wall would be of a cellular structure, all the spaces of which would be connected together in a regularly zigzag oblique direction to one another.

The upright lights above the front walls ought to swing on their centres, and not be made to slide horizontally, by which much rain may be kept out, and the great inconvenience arising from the swelling of the wood in the sash-grooves entirely obviated. A stage or set of shelves is generally required, ranging obliquely upwards, from about eighteen inches above the floor towards the back wall, in a direction nearly parallel to the slope of the glass roof. Another shelf, eighteen inches wide, made of bars or strips of wood, may be placed immediately under the swing lights against the front wall for bulbous-rooted plants, heaths, &c., the grating formed by the bars, securing the roots, from the bad consequences attending an excess of moisture; since, whatever quantity of water may run through the pots, will fall through the spaces between the bars and escape. The walk in this construction will pass between this front sparred shelf, and the lower shelf of the stage; it may also proceed along the *back* wall, in which case the platform of shelves should be curtailed in breadth, and a shelf or two, fixed upon the back wall itself, for succulent plants. In houses with double glass roofs, the stage ought to be in the centre, ranging in two slopes, corresponding to those of the lights.

The *flues*, or hot-water pipes, must be so situated as to distribute the heat equally. The circulation of hot water is most likely to afford this equal distribution, because the temperature of a stream of water flowing *from* a boiler, and returning *to* it in regular but slow progression, must be subject to comparatively little variation. Hot water also produces a sweet and innoxious heat. Wherever then, circumstances authorise this mode of creating an artificial climate, there, I think, it ought unquestionably to be adopted; but it requires an engineer who is well acquainted with this species of work, and with the power which radiating surfaces possess of regulating the temperature of a given number of cubic feet of air.

A *brick flue*, when placed above the floor being rather an unsightly object, it may be advantageously placed under, or rather on a level with, the floor. A flue to command a pretty regular temperature, ought, I conceive, to enter at one end of the house, not many inches within the front wall, proceed along its whole extent, then take a turn and be brought back about the centre of the floor, and finally, be carried into a chimney above the back wall at the same *end* of the house, though at an opposite corner, in which the fire is situated. The flues are to be so built that air may circulate around them: hence they must be placed in a channel dug in the ground, and wholly free from contact with the ground. Exits for the heated air must be provided for, either by gratings or by spaces left in the tiling of the floor. The temperature of the air in the greenhouse will thus be regulated from the surface of the floor itself to the roof, without the inconveniences of an incommodious mass of projecting brickwork.

A good flue has been calculated to heat between four and five thousand cubic feet of air to a temperature sufficient for the safety of greenhouse plants. Now, supposing the internal dimensions of a house to be as follows: height at the back 12 feet, sloping to 6 feet at the front, the medium being 9 feet; breadth 12 feet, and length 24 feet; $24 \times 12 \times 9$ will produce the sum of 2592 feet, the volume of air to be warmed. If then, the calculation of 5000 feet be correct, there can be no difficulty in supporting a sufficient degree of heat in a house of little more than half those dimensions *, by a flue of moderate capacity. This may be attained by building the outside and inside of the first course along the front wall, with four *bricks laid flat-wise* above each other upon the foundation or base course. These four bricks will form the depth and the side of the flue, which, with the mortar-joints, will be 12 inches in the clear; and by setting the other side of the flue 7 inches apart from the first, there will be a channel of 84 square inches in the clear, which will be found amply sufficient for a flue. The re-

* I have chosen to speak of the construction of low-roofed houses, because in them the fire, when required, will produce a more certain effect, and there is a great advantage in letting the plants be placed near the glass. The remarks need not interfere with the plans of those who prefer lofty structures.

turn flue ought to be built of *bricks on edge*, but not wider than the first, and both should be covered with paving tiles or flat stones. To secure the full effect of the flue, the fire-place should be sunk one foot or more below the entrance or mouth of the flue, so as to admit of a rise from the fire to the flue. This rise should form the neck of the flue, and be brought to assume somewhat the figure of a hopper. Thus, if the fire-place be 18 inches long, 12 inches wide, and as many deep, the neck ought to be so contracted, as that at its entrance into the flue, it is not above half the *breadth* of the fire-place, nor more than eight inches in *depth*. The flames of the fuel ought to deliver itself clearly into the flue; and to do this, the *neck* should not be much more than a foot in length;—the chief causes of a bad draught, and a smoky chimney, arising from the ill-calculated dimensions or shape of the neck. If the neck be short, and regularly contracted, till it be about half the size of the flue into which it enters, rarefaction of the air will be secured; and if, with these precautions, a moderate rise be provided, the rush of air will be great, which will render the draught secure in almost every possible state of the atmosphere.

The flue being built, its joints rendered air-tight, a space, as was before observed, must be left on each side of it, with openings in the pavement, for the free egress of the heated air. The *base of the flue* ought not to rest on the ground, but upon bricks laid apart, so as to form openings through which the air warmed by the bottom of the flue may pass into the channels left on both sides. A flue thus constructed, and carefully built, will be so efficient that very little fuel need be consumed; every particle of it will have its effect, and the house will be pleasantly heated without trouble, loss of time, or vexatious expenditure. I speak from my own well-grounded experience in this species of fire-work.

The *temperature* of the house is a point of the first moment; for it ought to be such as will *secure* the plants throughout the winter, and nothing more. Gardeners have erred greatly in endeavouring to force unnatural growth on greenhouse plants, in the middle of winter. The greenhouse is a harbour of protection,—a light and airy structure for the defence of rather tender plants, but it is not a *forcing-house*. Let any one care-

fully observe the consequences of keeping up what is called a growing temperature during the three dark and sombre months of winter, and he will be convinced, by the yellowish tint of the young shoots, and the lengthened and weakly state of the leaf-stalks, that the plants have not *grown*, but have been untimely excited to *expend* those sources of supply which had been lodged in the cells and vessels of nutrition for the future *seasonable* development of shoots and blossoms. *Solar light and heat must be present to excite a healthy expansion of the parts of plants*; and, therefore, to place the natives of southern climes, in which the meridian altitude of the sun is greater than it is with us during winter, in circumstances by which they are merely drawn up by artificial heat, instead of being stimulated by the solar beams, is to act in direct opposition to the ways of nature, and to the healthy action of the vital principle of the plant. I know that bulbs of many kinds, roses, and some other shrubs, may be forced during the winter months; there is no general rule without some exceptions; but, even with them, *exceptio probat regulam*; for they must be prepared, educated, for the work of forcing, and, by degrees, brought into a *habit* of growing at a required period. The case, however, is wholly different with the plants under consideration; for, in respect to greenhouse plants, in general, a state of winter rest, absolute dormancy, ought always to be allowed them. The *damp* of our winters is the great enemy to be guarded against; and, to obviate that evil, a free circulation of air must be promoted. Let *actual frost* be prevented; and, with the observance of this indispensable condition, let no more *fire-heat* be employed than may be required to keep the house, and its atmosphere, as dry as possible when the weather is either very cold or wet. *Air* should be admitted at the door, and by the front-swing lights; the latter opening backward, in the direction of the glass-roof, while they cause a free circulation, will effectually protect the plants from actual rain. In general, it will be prudent not to let down the roof-lights during the depths of winter, unless the weather be peculiarly genial and settled. Such weather occasionally occurs in January, with a temperature ranging between 35° and 40°. In unsettled states of the atmosphere, the wind may rise, and showers descend suddenly, and, the glasses being open, the

plants will be torn by the violence of the former, or too much wetted by the latter. Few plants well bear gusts of wind; heaths suffer much from them; therefore, it will be always prudent, while admitting air freely, to guard against draughts and currents. Water must be given to a certain extent, but it is far better to err on the side of dryness, than to create damp and too much moisture. Aridity is to be avoided; but, as long as the leaves of the plants do not actually droop, water should be given only in very moderate quantity during the winter months.

The greenhouse should be inspected carefully two or three times a-week, in order to remove insects, dead leaves, and weeds growing in the pots. Cleanliness, and the removal of every thing that is unsightly, or which can cause mouldiness or offensive odour, ought to be sedulously attended to. If the *aphis*, or any other insect, appear on the plants, the house should be filled with the fumes of tobacco. This herb, so dear to purchase, can be prepared at home with facility, and of a quality, as I have proved, if not equal, so nearly equal to the medium tobacco of commerce, as not only to answer the purposes of the gardener, but to be formed into cigars, the flavour and odour of which are very far from contemptible. As the growing season advances, more water and more air must be given: the plants should never be suffered to become droughted; for if the soil, at any time, be completely dry, it will be extremely difficult to restore it to its due temperament, and some plants are very sensitive of extreme aridity. Of this, and many other peculiarities which distinguish particular plants, I shall speak more fully when describing the individual species. While generalizing in this place, I shall only notice one fact more, that involves a physiological inquiry of considerable importance.

It is customary to remove the greater number of the tenants of the greenhouse to the open air, either in May or June, when the temperature of the atmosphere has become somewhat regular. I hazard the conjecture that this practice is altogether erroneous, in respect at least to those plants which are *always* to be retained in pots. I do not dwell upon the admitted fact, that the greenhouse is a structure of ornament, and that, when unfurnished, or left in possession of merely a few climbers or succulents, it is altogether despoiled and disfigured of its beauty. My position

rests upon the hypothesis, that whenever a plant has been grown under glass, its *constitution has undergone a physical adaptation to the artificial media by the stimulus of which it has been formed, and which unfits it for an entire change of situation and exposure.* There are few greenhouse plants, in their summer habitats, that appear to thrive and be in vigorous health; they cast their leaves, become discoloured, and are no longer objects of ornament. Watering is continually required, but produces a very slight amelioration; and the summer passes away before the verdure of the leaves is in any material degree restored. Shortly after, it is necessary to remove the plants to their winter abode, and there they receive a check, though only to a partial extent. I suspect that, with every change of residence, which affects so material an agency as light, acting either *directly* upon the organs of elaboration and respiration, or *through the medium of a screen of glass*, those vital organs, the leaves, are so oppositely and violently affected, that their communication with the roots is interrupted. Hence many, if not the whole system, of the finer absorbent organs become inert, and perhaps perish; and, until a fresh development of feeders is effected, the plant languishes. I could adduce many facts which confirm this theory, and which clearly prove that fine healthy plants, removed to the open air, from under glass, will inevitably lose all their leaves, unless they be placed in shade, and then kept cool and moist.

The greenhouse, to be at all seasons an object of ornament, and to secure its tenants in perfect growing health, ought always, in my opinion, to retain them. Let the waterings be regular, the air (not wind) be abundant, and, with these, let the strong direct solar beams be mellowed by the summer screen before alluded to, and I will venture to assert, that after one or two seasons' comparative experience, few real admirers of their plants will expose them to the alternations which heretofore have rendered them, during the height of summer, objects of secondary interest, if not of sensible disappointment. This subject will be further elucidated, when I describe some individual species: for the present, I pass on to the consideration of other structures for winter defence.

The first of these is, *the flued glazed pit.* Persons who aim

only to possess a hundred or two of plants, may preserve them effectually in one of these structures. The pit may be of any required dimensions; one with four lights, each light 5 feet long, and 3 feet or 3 feet 6 inches wide, resting upon rafters, and these upon a frame or wooden coping, will afford ample room. The walls may be either cellular, or built with single bricks. The pit should be partly sunk in the ground, and the back wall raised to a height to suit the taller growing plants; the lower or front wall to approach the surface of the ground, in order to admit as much light as possible during the winter. The slope of the lights ought to be considerable, not less than 18 inches from the back to the front; for drip and redundant moisture are the inconveniences which, in these low structures, are to be most particularly guarded against. In glazing the sashes, I recommend—and this remark I mean to apply also to the greenhouse—that the best glass, in oblong squares, 6 inches by 3 inches, be employed. Such glass can be had at the glass-warehouses in London, for about 6s. per hundred squares, and in the country doubtless for something less. The bars ought to be thin, the putty lightly laid on, just so much as will secure each pane in its position, and the laps of the glass should not exceed the eighth part of an inch. Putty made at home will cost a mere trifle: the best whitening, mixed thoroughly with about one-fifth to one-fourth, varying according to the heat of the weather, of its weight of good linseed oil, are all the requisite ingredients. The addition of a few grains of one of the oxides of lead (either litharge or red-lead), to the pound, will give a drying quality to the putty; but this will ultimately prove an inconvenience. The art of making good putty consists in the intimate incorporation of the two materials of which it is composed, till its *peculiar texture* is attained. This art will be easily acquired by practice. These pits ought to be protected from frost by a covering, consisting of double matting. This, in ordinary frosts, would be a sufficient protection; but, when the temperature is very much reduced, straw-mats should be added; and, over these, a set of boards. These boards are in themselves a good and efficient defence; but mats of one description or another ought to be interposed between the boards and the glass, in order to guard against accidents. Another

excellent protection against frost is a layer of perfectly dry saw-dust, to the depth of the largest of the pots within the pit. If the pots were plunged to the rims in this substance, the plants would, in a great degree, be secured from the attacks of that pest of tender-leaved plants, the small slug; and, at the same time, an equality of temperature would be maintained around the mould in the pits. The saw-dust, however, ought always to be fresh; for, when in a state of decay, it forms a nidus for multitudes of worms. A degree of fire-heat is occasionally indispensable in these pits; and this may be provided for by a very small furnace and flue, the latter running one course of two bricks in depth, 3 inches within the front wall, and returning upon itself to a small chimney over the furnace, on the outside of the corner at which it enters. From 35° to 40° is a fair average temperature in such a pit, the latter being the maximum by fire heat.

Another species of pit, the last I shall refer to, may be used with great advantage as an adjunct to the one last described; or alone, when the object is to keep and secure only those plants which are semi-hardy, and require no fire. It may be termed a *cold frame*, inasmuch as it performs all the offices of one, though capable of affording more efficient protection to plants. This pit should be built of well cut, straight, grass turfs, laid by rule and measure upon one another, so as to be adapted to a very simple frame and light, or pair of lights, which rest upon the turfs. These turfs ought to be built with a bold slope towards the south, or, if they are carried up straight on the four sides, the frame should be considerably higher at the back than in front. A double course of turfs would guard against frost laterally, and the frame and lights should be secured by a coping of other turfs placed around the frame, and by mats and boards above the lights.

The bottom of the pit ought to be laid dry with rubbish, then covered with tiles, and finally with a deep layer of sawdust, into which the pots should be plunged. Much more might be said on the structure of pits; but as I have already extended these general observations beyond my original intention, I shall conclude with a few observations on the qualities of water and soils, applicable to the plants usually grown in greenhouses and pits. I have

the authority of one of the first cultivators in this country, Mr Mearns, gardener to the Duke of Portland, to appeal to, when I recommend the water of ponds that has accumulated by drainage of fields or pasture land, as the most suitable to plants of every description. Rain-water, caught as it falls, and retained in tanks or open vessels, is much better than the water of wells. Soft rain-water is excellent, but that which has percolated through a body of growing turf is preferable to every other. I quote Mr Mearns's own expressions:—" Soft pond water, such as is supplied from the watering or floating of meadows, holds in solution, and in its most limpid state, all the food which most plants require; and it is only such food as they are capable of taking up by their spongioles, or digesting by their system." Such water is not attainable by every person; but I think that a good substitute might be artificially procured by placing some turfs from a common or sheep-walk, into a large wicker-basket; and, after nearly filling the basket with them, to place *two turfs, manured with a thin layer between them of poultry or sheep-dung*, at the top of the basket. The best and softest water that can be had should then be poured over the turfs till it filtrates, in a clear state, into a recipient vessel placed underneath. A bushel-basket would last, for this purpose, many weeks, and suffice for the saturation of some hundreds of gallons of water with nutritious matter, and also for the detention of other particles which could not be assimilated by the organs of the plants.

The *soil* suitable to almost every species of greenhouse plant, is a mixture of loam and peat or heath mould (bog-earth as it used to be called). But what is loam? Test *that* which is so styled by every gardener; try it by chemical re-agents, and its components will be found to vary, either in their quality or proportions: the expression, then, is indefinite. A *sandy* loam, of a hazel-brown, and of a texture that, when in a medium dry state, will, if pressed hard in the hand, separate freely when let fall upon the ground—such a soil may be found, and will be suitable to plants. *Heath-soil*, of a black colour, and spongy unctuous texture, particularly if replete with white sandy particles, forms a valuable soil; but, in its absence, perfectly decayed vegetable soil of leaves and weeds may be successfully substituted. From a conversation I lately had with an able practical

gardener, and the inspection of his compost materials, I am satisfied that much good soil may be made, and a great deal of the doubt arising from the uncertainty of soils obviated, by collecting the harrowings of fields that have been ploughed for the destruction of couch-grass, laying the matted roots, and the soil they retain, in heaps to decay into mould. Time is required for this work; but the result of it is a soft, mellow, earth-like matter, equally fertilizing to the objects in the vegetable as in the flower-garden. In it cucumbers, melons, and pine-apples will grow luxuriantly. This vegetable earth, blended with two or three year old leaves, would, my informant assured me, bring to the highest perfection every inmate of the frame, the greenhouse, and the conservatory.

In order to free these composts from the larvæ or grubs, visible or invisible, of insects, it is only necessary to collect the prepared soil and the decayed leaves, in the *driest weather*, and in the *driest condition;* and, when in that state, to place them *under a shed*, open to the air and sun. So guarded, they *remain* free from grubs and vermin; and, during the winter, attract sufficient moisture to become, by the potting season of the ensuing spring, fit to mix, in any proportions, with one another. The mixtures of these two ingredients, in different proportions, according to the nature of the different species of plants, constitute the best soil that need be applied to the roots of any potted plant whatsoever, the heaths alone perhaps excepted.

ON BURNING HEATH TO RENDER IT AN EFFICIENT PASTURE.

By Mr Alexander Laidlaw, Bowerhope, Selkirkshire.

Heath, a shrubby plant so common in many parts of Britain, that few can be unacquainted with its general appearance, belongs to the class Octandria and order Monoygnia of Linnæus. It stands in the natural order Ericeæ. Though there are many hundred species of heath, few of them are indigenous to our native isle; and only one, the common heath, ***Erica* (*Calluna*) *vulgaris***, that is extensively useful for pasture. There are many other varieties of the common heath which all exhibit

the same nature and qualities. The blossoms partake of all the variations of colour, from a darkish red to pure white; and the leaves show a corresponding variety in their shades of colour, from a dark to a light green. Heath may be said to be an evergreen, as it never sheds its leaves. It is also a social plant, as solitary individuals are rarely met with; and, in many places of England and Scotland, it covers almost exclusively a very considerable portion of the soil. It is proverbially late in the season in putting forth its tender shoots. Unless in the season of blossom, its general appearance is dark and rather unpleasant; but, when it opens its pretty little flowers to the noonday sun, their chaste pale pink colour cannot but arrest the attention, if not the admiration, of the most ardent lover of exotics. It is used for food by various animals, from July to March, and sometimes to April, according to the nature of the season.

The value of heath, as food for sheep, is of two kinds. It gives a hardihood to the constitution which sheep, bred on a soft grassy pasture, by no means possess. Hence its great value where the rearing of young sheep for sale is particularly attended too. That our southern neighbours are well acquainted with this invaluable quality in heath for young sheep—the following anecdote will show. When, upwards of thirty years ago, I was attending a Stagshawbank fair, I remember the late Mr Robert Hope, Newton in Craufordmuir, bargaining about a drove of hoggs with a south country dealer. The knowing southron did not readily agree to the price asked, because he was rather incredulous of the nature of the pasture on which they had been reared; a hogg was instantly laid hold of, and amongst its wool was seen a good many small sprigs of heath. On this discovery, Mr Hope, with that characteristic smile which indicated the suavity of his manners, said to the purchaser, "This is proof positive that they have been bred on a heathy pasture." "Oh yes," said the now placable *Sassenach*, "I see, Mr Hope, you are a bit of an honest fellow, I'll take the hoggs."

The superiority of heath to every other kind of pasture in snowy weather is quite apparent. Its bushy tops present a bed for the snow to rest upon, and its tough stump prevents the snow crushing it down to the ground. The snow is easily dislodged by a few strokes of the sheep's foot; and the plant thus

affords a ready, invigorating, and enticing bite to the hungry animal. Also, when keen frost, succeeding a partial thaw, has unhappily sealed up every pile of grass, the same properties of the plant cause the incrusted ice to yield readily to the stroke of the sheep's foot, when the animal exerts itself in search of food. It will also shew its dark sprigs above the snow, when all other kinds of pasture are buried under foot.

Heath, though a short insignificant looking plant, will, on its own native soil, arrive at a great age before it is done growing. To my knowledge some patches, which are suffered to remain, because particularly useful for shelter, have looked like old heath for half a century. But in this state it furnishes fewer of those tender green shoots which do not blossom, and which is the only part of the plant that sheep or birds will eat, unless under severe privations. During its various stages, from a weak seedling to an old sapless burnt stem, it only gives out long and tender shoots when a young and vigorous plant, and not when it is old and bushy. But when a judicious system of renewing the heath is properly attended to, these old patches are rarely necessary.

Having thus shortly mentioned some of the properties of heath as a valuable kind of pasture, I shall now state the way in which it is best obtained for this purpose. A judicious system of burning heath appears to me the only way by which the farmer, in most instances, can realise it as a desirable pasture. But the nature of the soil, and the particular time of the season when it is most wanted for pasture, ought to be carefully attended to, before the operation of burning is attempted. If it grows on a peaty soil, with a considerable mixture of deer's hair, *Scirpus cæspitosus*, it cannot be too often burnt, as the deer-hair is always best for pasture in the ensuing summer months. But if there is a considerable mixture of hair-tail rush or moss-crop, *Eriophorum vaginatum*, frequent burning is hurtful, as this plant, unless a little sheltered from the keen winter frost, does not afford much green food for the spring months. On the higher parts of the country where the heath is, for the most part, only available for summer pasture, it should always be young and short. But where there is much dependence on it for winter and spring food, it should be allowed to grow much

longer, at least ankle deep; and, where much snow falls, it should reach to the calf of the leg. On places where the soil is mostly peat, with a considerable declivity, it grows faster than on flow moss or lea ground. On this last position, if it is suffered to grow very strong before it is burned, it is generally several years before it become again useful for pasture. The reason seems to be this: In the process of burning so much combustible matter, the scorching heat consumes the greater part of the seed, and it is only from those seeds which escape the combustion, or are accidentally brought from the standing heath in the vicinity, that the reproduction of heath takes place.

I may here notice a mistake which some speculative men, when writing on this subject, have fallen into, namely, that the reproduction of heath is from the parent-stem; and to establish their assertion they adduce the fact—that heath is only easily extirpated when burnt at an advanced period of the season. But this extirpation does not arise, as is said, from the heated sap descending the stem of the plant, and scorching the roots, and thus depriving them of vegetative power; but, from the delicate and unprotected state of the young seedling, which, with the seeds still in the ground being left exposed without the least shelter, cannot be expected to retain their vegetative powers amidst the rattling rains and nipping frosts of winter. Unless with the design to extirpate the heath altogether, a great breadth of pasture heath should never be burned in one place, for, as the young seedling is very tender, and the soil, after burning, is often loose and friable, it has to struggle with many obstacles, before it gets a complete hold of the soil. Another reason that a whole patch of heath ought never to be burned in one year is, that several active agents, such as the wind, rain, birds, &c. will be in operation, to diffuse and scatter the seeds over the new burnt ground, from the heath standing at a short distance, which they could not do so effectually were it placed at a great distance. This arrangement should be carefully attended to, for, if cautiously gone about, it may be easily accomplished. In a day of steady wind set on fire only a small part at once, keeping to windward; after the straight line on which you have advanced forward has received a little burning, switch out the side or oblique flame with a bushy branch of willow, birch, &c.

Next season go to work in the same manner, keeping always in mind that too little can scarcely be burnt at one place in one season. Thus and thus only can you have a regular healthy pasture of heath which will serve the season.

It is inexpedient, and often hurtful, to attempt to eradicate heath from a peat soil. It can scarcely be done by burning alone, but it is doubtful if it be succeeded by a more valuable herbage. But, on a lea or friable loam, or clay-soil, it may be kept down pretty well for a long time by burning large patches at once; and though it will certainly make its appearance again, it will be a long time before it completely covers the soil. But, before the work of extermination is begun, it ought to be considered whether, in destroying one plant, we do not prepare the means for the dissemination of a less valuable one. All thin friable soils, and especially such as have a bleak northern exposure, are apt to be, when denuded of heath, covered chiefly with moss, and when this is the case, the pasture is rendered almost good for nothing; for heath, independent of its value for shelter to stock, and the grasses intermixed with it, will give more food on these scraggy thin soils than the mosses and herbs which will succeed it. As heath does not grow readily on an enriched soil, —spreading lime upon it,—folding sheep on one place all night till it is manured, and flooding it with water—will assist in extirpating it. But little can be accomplished in this way on many farms.

But, though burning heath, bent, &c. is of great importance to the storemaster, it is hurtful in many cases to the general thriving of the stock. If, from ignorance, inattention, or carelessness on the part of the shepherd, the young sheep are allowed to lie too long on the new burnt ground, they will very likely be attacked by the disease called *Pining*. To prevent this the shepherd should every morning, about seven or eight o'clock, turn them into more juicy succulent pasture. If this cannot be obtained, let them be gathered into some spot where they are likely to get grass and plenty of good water. Where "summering" the young sheep, that is herding them on the high part of the farm in the summer months, becomes a part of farm management, no evil is likely to ensue from burning.

The best time for burning heath intended for pasture is from

he middle of March to the beginning of May; after that time, f the season is not very late, the deer hair—with which the eathy moors are often partially covered—will be scorched in he tops and made unfit for pasture. The time of burning is imited by law to the 10th of April; and as this is the law of he land, over which individual proprietors have no control, the enant must, in wet seasons, either submit to be mulct by the Sheriff Court, or be deprived of proper pasture for his flocks luring the ensuing season. If he has much high mossy ground e will prefer to suffer by the *first*, as the lesser of two great vils.

From an over anxious desire to preserve game, some proprie- ors restrict the tenant from burning heath at any time. This mproper restriction, I have no hesitation in saying, militates gainst the interests of both landlord and tenant, whose inte- ests, generally speaking, are *one and indivisible.*

Judicious management seems to rest between burning too nuch and too little. If the tenant injudiciously proceed to the xtreme operation of burning the whole heath, so that there is ot a sufficiency left for hatching and sheltering the young reeds of game, it is necessarily hurtful to the proprietor who aturally wishes to protect his grouse; but, as the game as well s the sheep feed mostly on the tender green shoots put forth by he heath before it becomes very old, the respective interests of andlord and tenant, in respect of burning heath, will, in this, s in most other cases, be still *one and the same.* To preserve eath till it is old, rank, and harsh, to increase the quantity of game, would be as absurd as to imagine that to possess plenty f insipid stagnant water, would be the only means of inducing he sprighty "siller grey" salmon to breed in it!

Heath is eaten by sheep, goats, cows, and horses. But, as it s of an astringent nature, sheep do not relish it at all times. They are fondest of eating it at night and in the morning. Ewes eavy with lamb, when confined too long upon it, are apt to ake a disease called the *heather cling*; and sometimes a good nany die of this disease. In this case it is necessary to admi- ister purgatives to recover the sick, and laxatives to preserve the ealth of the stock. Heath may be propagated where it does ot previously exist, merely by gathering the seeds in autumn,

and sowing them in the spring. The rains will wash down the seeds till they reach the soil, when part of them will vegetate; but the plants come slowly forward if unprotected, they being keenly eaten by the sheep, especially if heath is scarce upon the farm.

AN ACCOUNT OF THE ORCHARDS IN CLYDESDALE.

As the orchards in the county of Lanark have long been considered superior to those in every other district of Scotland, and have been much extended and improved within the last thirty years, an account of them, I hope, will be acceptable to the readers of this Journal; for although fruit is one of the luxuries, rather than a necessary of life, and though it is rather the produce of the gardener than of the farmer; yet orchard husbandry is so much connected with agriculture, that it may also be considered as an important branch of that useful art; and as the orchards of Clydesdale have been found to yield a profitable return, and as many other districts in Scotland seem to be equally propitious to the growth of all the ordinary species of fruit, the subject seems to merit the attention of the proprietors and occupiers of such land as is best adapted to that branch of industry.

It appears that, in various instances, particular branches of rural industry have been carried to a considerable and profitable extent, in certain districts of Scotland and England, in which no material local advantage for those branches of industry can be easily traced above other districts, where the same branches are rather unknown or much neglected. This effect seems to have arisen from a system of improved husbandry having been adopted by the inhabitants, at a remote period, and which, receiving much attention, has been there brought to greater perfection than in any other part of the country, even where local circumstances are equally favourable for it. The general prevalence of dairy husbandry in the county of Cheshire, and in the northern district of Ayrshire, from time immemorial, does not seem to have been so much influenced by local advan-

tages for that particular species of husbandry, as, having been established in these counties at some remote period, and being retained by custom, has been much improved by the inhabitants. The Stilton and Gloucester cheeses might be made in many of the other counties of England to as great perfection as in those places whose name they bear. Nor does the superior veal fed in the parish of Strathaven, and some other parishes of Lanarkshire, proceed from any local advantages over other parts of Scotland or England, where food for milch-cows abounds. Similar remarks apply to the orchard husbandry on the banks of the Clyde, which has not arisen from any peculiar local superiority of soil or climate over the lands on the banks of many other rivers and streams in the arable districts of Scotland; but it arises chiefly from the growing of fruit having been attended to at a very early period, and been gradually brought to great perfection by the industrious inhabitants of that district.

It seems impossible now to discover at what period the inhabitants of Lanarkshire first began to attend to orchard husbandry; for although fruit-gardens and the art of ingrafting are mentioned in Scripture, as well as by the Greek and Roman writers, it is not probable that the wild fruit of Scotland had been improved by the aboriginal inhabitants, until their attention was directed to the subject by the monks, or other Popish clergy, who brought the knowledge of gardening to this country from Italy, or by such of the nobility and warriors who had seen the value of the art when abroad, probably during the crusades. We are indebted to the monks for many improvements in husbandry. The remains of orchards that are still to be seen at the ruins of the monasteries of Pluscardine, Lindores, Jedburgh, Dryburgh, and, till lately, at Paisley, shew that gardening was cultivated by them with considerable taste in Scotland; and, fortunately, the trees were not destroyed with the churches at the Reformation.

In giving an account of the orchards on the banks of the Clyde, the following arrangement may be followed. In the first place, I shall inquire into their *extent;*—advert to the *localities* which affect them, such as soil, shelter, situation;—mention the *kinds of trees* generally planted in them;—describe the *mode* of planting and treating them;—state their *produce,* and

how it is disposed of;—enumerate the *crops* which are cultivated *under* them;—give the *rentals* of the orchards;—indicate the *causes* of the *failure* of the crops of fruit;—and conclude by stating the *advantages* and *risks* of this branch of industry.

The *extent* of the orchards in Lanarkshire cannot be precisely ascertained. They are situated on both sides of the Clyde, chiefly from the foot of the Mouse-water, a mile below the town of Lanark, to Bothwell Castle, six miles above Glasgow, a stretch of about sixteen miles; and they extend in some places more than two miles from the river. The following, however, is the most correct statement of the extent of land occupied with orchards in that district, that can easily be obtained. When the late Mr Nasmyth wrote, about 1793, a preliminary account of Lanarkshire, for the Board of Agriculture, he reported the orchards, in the range mentioned above, as extending to 200 Scots acres; but, in his enlarged survey, published in 1806, he states them as having been extended to 340 acres. At present, the account given me by the proprietors, their gardeners or tenants, of eighty of the principal orchards that I inspected, extend in all to 800 acres; and the small orchards or gardens in the town of Hamilton, and ten villages in that district, will, exclusive of the small gardens at the farm-steads, extend to 180 acres more; or, in all, to 980 Scotch, or about 1200 imperial acres. These town and village gardens are chiefly occupied with pot-herbs; but the fruit-trees are closer in them, are more manured, and generally more productive, than the trees in larger orchards. Many of these village-gardens are of considerable extent, having frequently jargonelle pear-trees upon walls, which yield valuable crops. A single tree of that species, in a favourable situation on the gable of a house, has sometimes yielded five *sleeks* of pears, 50 pounds to the *sleek*, which, some years ago, sold at 30s. per *sleek*. These gardens also yield excellent crops of gooseberries and currants; and although the value of all sorts of fruit have fallen very much, yet, from the orchards being better managed than formerly, they still yield a considerable revenue, and have been much extended within the last twenty years; and are still extending.

The *localities* of the Clydesdale orchards are so varied, that they cannot be easily described in the bounds of a limited paper

like this. The *general aspect* of the orchard district resembles an open book, laid upon a reading-desk, with the river Clyde running down the groove formed by the leaves in the middle of the book. The bed of the river at the lower end of the orchard district, is only 50 feet above the level of the sea, and at the upper end it is about 200 feet higher. Some parts of the orchard ground is only a few feet higher than the river; but others of them are from 100 to 200 feet higher than the Clyde.

The *soil* of these orchards varies much. Three-fourth parts of them are a clay soil, some of it so deep and rich as to fall under the description of a clayey loam; but much more of the soil is a stiff and rather sterile clay, resting on an adhesive tilly subsoil, over sandstone of a reddish tinge, which alternates with the ordinary coal-formation. In some places the soil is more friable or sandy; and some of the principal orchards, as at Camnethan Priory, Dalziel-House, Mauldslie Castle, Holmsfoot, &c. are on alluvial holm or carse land, some of it of considerable depth; and as that species of soil is situated near to the river, and generally well sheltered, the trees on it are mostly of the best kinds, and the fruit they yield is rich in flavour and of good quality. But a large portion of the orchards of Clydesdale have been planted on land that is considerably elevated above the bed of the river, on steep ground, even where arable; and indeed the half of these orchards are on steep braes and banks of burns that fall into the Clyde. For two or three miles at the upper end of the district, the soil and subsoil rest on a species of indurated sandstone, of a brown colour, and nearly as hard as whinstone; but the soil and subsoil incumbent on that species of rock, is no way different from that on the other parts of the orchard range, viz. a strong clay and tilly subsoil. A clay soil, however, when kept dry, well manured, and properly worked, yields the best fruit. On sandy land, the trees grow faster than on clay, but do not yield so much fruit. The small fruit, however, thrive better on a light soil than on clay.

Although many of these orchards have been planted on sterile ground, where the colour of the soil and minerals indicate the presence of iron; yet it does not appear that the trees or fruit are in any degree more liable to canker, or acquire other local diseases, than the fruit-trees in other situations; but as that species

of soil, when it rests on the coal-formation, is never so fertile as that which is incumbent on whin-rock, it is probable that the fruit-trees partake of that sterility, which, in such soils, injure other species of crop; and in a district where the minerals, and even the soil, is heterogeneous, some parts of it may be less propitious than others to the health of the trees, and quality of the fruit. But it does not appear that the soil contains any quality that is materially injurious to the growth of the fruit of the ordinary kinds of fruit-trees. The general poverty of the soil only retards the growth of the crops in these orchards; and that defect can be partially remedied by culture, and the application of manure. Where the melioration of the land is neglected, the trees, in any ordinary soil, and especially on that which is naturally sterile, become scrubby, encumbered with moss, and, of course, yield fruit of inferior quality.

Mr Smith, who has published a map of the strata in England, says, that all the best orchards there are planted on a stratum of *red marl.* That species of soil or subsoil has not been yet found in Lanarkshire; but a dry rocky subsoil, if the soil over it is of good quality, and of proper depth, is always found to be favourable to the growth of orchard fruit. Sloping banks and braes, if they are not too steep, are also favourable to the growth of fruit-trees; as, in such situations, the roots expand both up and down the banks more than they do on level ground. On a plain surface, the trees shade each other, and exclude the heat of the sun from the ground and their roots; but on braes, the sun and air reach each tree, the same as if none else grew near it; and as there is generally a purling stream in such dells, the sun and dry air exhale from it, in times of drought, a supply of moisture, which the trees require, but which they cannot enjoy when situate at a distance from water. It is therefore an oversight in any proprietor of land to suffer such banks and braes to remain unplanted with fruit-trees, particularly those whose soil is good, and lie at a moderate altitude; and where the soil is inferior, or too elevated for fruit, these banks should be planted with forest-timber.

The *climate* of the orchard range of Lanarkshire is of a medium quality, like that of the southern districts of Scotland. The more frequent rains on the western than on the eastern

shores, reach these orchards; but they are, in a great measure, out of the reach of the cold easterly *haars*, which so often arrest vegetation for a time in the east side of the island. There are many mosses in the county of Lanark, but none of them in that part of the banks of the Clyde.

Shelter to the orchards is much wanted in some parts of the district, especially where the newly formed orchards, as on the estates of Wishaw and Coltness, have been planted. Those situated near the Clyde, or on the banks of sheltered dells, are generally well protected from nipping frosts or heavy winds. Mildew or hoar frosts seldom injure the crops in that part of Clydesdale. There being no marshy ground near the orchards, and as the Clyde is too great and rapid a river to be so heated, in clear, warm weather, as to throw off much vapour, in chilly evenings, following warm sunny days in summer, hoar frosts or mildews seldom infest that important part of the river, as they often do from shallow, slow running streams.

The *kinds of trees* which are generally planted, and found to be most productive of fruit in the Clydesdale orchards, are mentioned in the following list; and those which are most liked are described, so as to prevent difficulties in recognising them, where the nomenclature varies in different parts of the country.

The selection of proper kinds of trees, suited to the soil and climate, is a matter of great importance in forming an orchard; and it is a great advantage to have the scions of the trees, which are grafted on true crab stocks, taken from a healthy tree; the plants to be three years old after grafting, and from three to four feet in height, having their roots equally disposed, so that they may extend in every direction. Young trees which have twisted roots, or are unshapely, either above or below ground, will never thrive well.

Some orchardists rear and graft the trees they plant; but others purchase them from Mr Scott, at Orchard, or from Mr Lang of Nethenfoot, both of whom raise and send to market excellent plants of all the best sorts of fruit known in Clydesdale; and as their nurseries are in the middle of the fruit district, no mistakes can arise as to the kinds of trees required, as sometimes happens when trees are ordered from a distance. Robert Lockhart, Esq. of Castlehill, ordered, some years ago,

several hundreds of pear-trees, of the best kinds, and planted them on rich land, in front of Camnethan Priory. The trees grew well; but when they began to shew blossom, and yield fruit, about eight years after they were planted, he found, that instead of the rich well-flavoured pears he had ordered and expected, the whole of them were of the kind known in Lanarkshire by the name of "*pear-devil*," the worst of all pears. He of course instantly cast them out, as cumberers of the ground.

Some orchardists plant pears on light soil, and apples in clay land; but it has been found, in the principal orchards in Lanarkshire, that pears do better than apples in a deep strong clay soil; and even in the most sterile clay that has been planted with fruit-trees in that country, the pear-trees have attained greater size, and yielded more fruit, at the age of twenty years, than apple-trees; but apple-trees are the earliest bearers.

Experienced orchardists know, that, not only in particular soils, but in many situations, some kinds of both apples and pears thrive well, while the same species will not thrive nearly so well, nor be so productive of fruit, in other grounds and situations which appear to be similar, in so far as the most skilful cultivator can discover. This may sometimes proceed from some peculiarity in the constitution of the trees; but it also proceeds from something in the soil or situation, which no horticulturist has ever been able to explain. Experience, however, is the best guide in such matters; and it is most advisable, in planting orchards, not to trust altogether to a few kinds of fruit-trees, however well they may be recommended for the peculiar soil and situation; but to plant a variety of kinds, so that if some should fail, others may have a chance to become produc-

[illegible] Another advantage of planting a variety of sorts of trees [illegible], that they come into flower at different times. It may happen, that a single night's frost, or a cold, damp easterly wind, or blight, will destroy all the blossoms that happen to be in the most critical stage of growth at the time; while other trees which have either not come into full blossom, or have advanced beyond the dangerous period, may escape injury, and [illegible] their return. When standard-trees are planted at proper [illegible] from each other, it is a common practice to plant an [illegible] such as a Hawthornden, summer strawberry, Car-

lisle codlin, nonsuch, &c. between each two of the standard-trees. These begin to yield fruit the second year after they are planted; and as they soon canker and become unhealthy, they are dug up by the time that the other trees come to proper size, and begin to be productive.

The trees most commonly planted in the Lanarkshire orchards are the following.

EARLY APPLES.

Tam Montgomery.—A yellow apple, rather above the medium size, with small protuberances at the top-end, which the Clydesdale people call "cornering." The trees grow to a tolerable size, and are excellent bearers. The name is taken from a man in Ayrshire, who, for many years, had the only tree of that kind, and would neither tell how he came by it, nor allow any person to take a twig from it. But since his death, his name has been perpetuated, by the extension of this valuable tree.

Early Almond,—Is a large round apple of a red colour, and of excellent quality. The tree bears early, and puts forth strong shoots, but is much hurt by canker.

Milford.—A small red coloured, long shaped apple of good quality. The trees are strong growers, but rather shy bearers.

Juneating,—Is a small fine flavoured, solid, hard apple. The trees healthy and good bearers.

Drylaw Pippin,—Is a small yellow apple, having an uncommonly fine flavour. The trees grow well, and are good bearers.

White Marrow.—A large good apple of a yellow colour, and coroneted. The trees are healthy, and very productive.

Summer Strawberry,—Is a large beautiful apple, of a yellow colour. The trees are good bearers, but much given to canker.

Hawthornden.—A large good apple, rather long and coroneted, but do not keep long. The trees grow fast, with few branches, but are greatly hurt by canker.

Nonsuch,—Is a large apple of good flavour and quality. The trees grow well, but are very liable to canker.

Marigold or *Saffron Pippin,*—Is an excellent table apple, rather above medium size, yellow and red streaked. The trees are fine growers, healthy, and good bearers.

Early Magdalene,—is an apple of medium size, and having a good flavour. The trees are ready bearers.

Bowyer's Lady Apple,—Is large and beautiful, of a red and yellow colour. The trees are healthy and excellent bearers.

Thorl Pippin,—Is a beautiful apple, much relished at table, and the trees are good bearers.

White Keswick Codlin,—Is a large yellow good flavoured apple, much

relished at table, and coroneted. It is frequently made into jelly. The trees are good growers, and very productive.

Lemon Pippin,—Is a large beautiful, yellow and russetty fruit. The trees bear early, but are not very productive.

Oslin or *Arbroath Pippin,*—Is a good early table apple, and the trees grow freely by cuttings.

HARVEST APPLES.

Hollands Pippin.—A large yellow apple for the table. The trees grow well, and bear freely.

Silver Saturday,—Is a large well flavoured fruit of excellent quality, and of green and yellow colour. The trees are good growers, and ready bearers.

Camnethan Pippin,—Is a large beautiful table fruit of the very best quality, streaked red and yellow, rather of a long shape. The trees are large, healthy, and of good size, and excellent bearers.

Golden or *Carphin Pippin,*—Is a small red apple, much relished at table. The trees healthy and good bearers.

Golden Leadington.—A large, long shaped, yellow apple, of a sweet taste, much relished. The trees grow well, and are good bearers.

White Cluster,—Is of a medium size, and of a beautiful red colour. The trees healthy, and good bearers.

Holmfoot Transparent,—Is a beautiful streaked apple, of medium size. And the trees healthy and ready bearers.

Harvest Pippin,—Is an apple of good size, streaked red and yellow, and of agreeable taste. The trees grow well, and yield much fruit.

Valleyfield,—Is an apple of red and yellow colours, medium size, and agreeable taste. The trees are healthy, and bear readily.

Wheeler's Russet.—An apple for the table, is of a moderate size, and rich flavour. The trees large and good bearers.

Dumbarton Pippin,—Is a small apple of a green colour, and rich lavour. The trees healthy and very productive of fruit.

Golden Rennet,—Has red and yellow colours, streaked, and is good or the table or the kitchen. The trees are ready bearers.

Whistleberry or *Luffness Pippin,*—Is a large yellow apple of a rich aste. The trees grow well, but are shy bearers.

Mala-bona,—Is a large, long, coroneted apple, of a red colour. The ees are good bearers, but very liable to be hurt by canker.

Bloodheart,—Is an apple for the table, of medium size, rich flavour, nd a red colour, both on the outside and within.

Lady's Lemon,—Is a yellow apple, of medium size, and good flavour; ut the trees are slow bearers.

Crimson Egg,—Is a small apple of an orange colour.

Golden Mundi.—A good and beautiful table or baking apple.

WINTER APPLES.

Carse of Gowrie.—A large apple of yellow and green colours, excellent for baking. The trees bear well, but are infected with canker.

Red Marrow,—Is a fruit of medium size, of a red and green colour, and the trees are good bearers.

Winter Strawberry,—Is a fruit of medium size, of yellow and green colours. The trees are good bearers, but liable to canker.

Ribston Pippin,—Is a large green table apple, much cultivated in the west of Scotland. They keep long, but the trees are slow bearers.

Kentish Pippin,—Is a large beautiful table fruit, but not of the richest flavour. The trees large and healthy.

Red Cluster,—Is a hard round apple, small in size, of a red colour and good taste, keeps long, and the trees are good bearers.

Gogar or *Stone Pippin,*—Resembles the Red Cluster; and the trees grow well, and bear readily.

Norfolk Beaufin,—Is a large apple of green and red colours, used for baking, keeps long, and has a rough russet skin. The trees are good bearers.

Late Fulwood,—Is a large and excellent tasted apple, of a green colour, used chiefly for baking. The trees are large and bear readily.

Early Fulwood,— is a baking apple of a dark red and green colour. The trees are large and good bearers.

Yorkshire Green,—Is a large green baking apple, excellent for sauces, and keeps long. The trees grow fast, but are much injured by canker.

Salmon Apple,—Is beautiful, and keeps long.

Curpendy (Court-pendu),—Is a sour apple of medium size, but keeps well. The trees are rather shy bearers.

Lemon Pippin,—Is a streaked fruit of medium size, and the trees rather shy bearers.

Grey Leadington,—Is a long shaped, good flavoured baking apple, of moderate size. The trees are shy bearers in Clydesdale.

Stoup Leadington,—Is a large baking apple, of a red and green colour, and the trees are good bearers.

Russian Transparent,—Is a yellow coloured apple, of a moderate size, and has a sharp taste. The trees grow well, their branches hang downward, but they are tolerably productive.

Paradise Pippin or *Magnum Apple* or *Lady's Finger,*—Is a long and beautiful fruit. The trees are good bearers.

Sheepshead,—Is a large coarse baking apple. The trees grow well, and yield much fruit.

Corstorphine Pippin,—A small beautiful apple, of red and green colours. The trees bear well.

Irish Cluster,—Is a fruit of medium size, and red colour; a showy apple, but not of a rich flavour.

Besides these, many other kinds of apples are raised in the Clydesdale orchards; as the *Red Pursemouth,* a new kind; *Doonside; Egg Apple; Red Bitter-sweet; Kentish Fill-basket; Whitemore; Striped Coalhouse; Early Julian; Dalmahoy; White Custard,* &c.

PEARS.

Jargonelles.—On walls are very productive.
Crawfurd pears abound in every orchard.
Grey Honey.—A round early pear; trees large.
Auchan.—A good pear, and the trees good bearers.
Pear Saugh.—Large yellow fruit, and large trees.
Lady's Lemon.—A good early pear; trees great bearers.
Green Pinkie.—A small early green pear; trees productive.
Farrow Cow.—A large pear; trees large and good bearers.
Green Chisel.—A good pear.
Elshonhaft.—A rich pear; the trees large and productive.
Early Carnock.—An excellent summer pear.
Pear James.—A good early pear; trees good bearers.
Golden Knap.—A small summer pear; trees good bearers.
Pear Robert.—A coarse pear; trees large, and good bearers.
Bergamot.—A large red pear; trees great bearers.
Green Vicar,—Is of inferior quality, trees productive.
Red Vicar.—A good pear, and the trees good bearers.
Green pear of Yair.—A rich juicy pear, trees productive.
Beurré.—A brown good pear, trees good bearers.
Moorfowl Egg.—A grey late rich pear, trees shy bearers.
Grey Goodwife.—A late, grey, juicy pear, trees productive.
Pear Earn.—A good fruit, trees ready bearers.
There are many others of inferior quality, as *Yellow Calder; Swan Egg; Briar Bush; Pear Pepper; Pear Wash; Pear Devil, &c.*

PLUMS.

Many of the ordinary kinds of plums are raised in the orchards, or on walls, in Lanarkshire; as the *Magnum Bonum, White and Red Bullace; Golden Drop; Damson; Damask; Honey Plums; Precoce de Tours;* and many others. But the *Burnet* plums are the most common, and most profitable. The *Horse Jarg* makes a good return some years. The *Devon* plums frequently yield great crops. The *Orleans* and *Green Gage* sometimes yield valuable crops, but are not so certain as the *Burnet.*

Cherries are not planted in Clydesdale, except on walls, and even here they are carried off by birds.

The *modes of planting and managing* fruit-trees have been variously conducted and understood by gardeners and orchardists, and many plans have been suggested for promoting their growth, and rendering them productive of fruit of an improved quality; but some of these plans have been found to be rather fanciful, and have been abandoned. Perceiving that all sorts

of trees grow well in rich deep soil, some have not only heaped rich earth together, for fruit trees to grow on, but have laid flags, or formed causeways, under the trees, to prevent them extending their roots into the subsoil. It has been stated in favours of these precautions, that, on digging up an ancient garden at Deer, it was found that a bed of rich earth had been laid to a considerable depth over the subsoil,—that a causeway had been formed above that earth,—a bed of sand, of a foot deep, over the pavement,—another causeway above the sand, and three feet of rich mould had been heaped over that pavement; and into which the trees had been planted. This sort of preparation of the soil for fruit-trees appears to have been done at a vast expense, to little purpose. The two causeways could do no good, as the roots of the trees would easily penetrate both of them, and enter the subsoil in spite of all that costly preparation.

The intelligent orchardists in Lanarkshire have acquired more correct knowledge in managing orchards, than the monks had possessed prior to the Reformation, so that their horticultural practices have required reformation, as well as their theological opinions. Some modern orchardists have indeed placed flat stones under fruit-trees, to prevent, as they conceived, the roots reaching the subsoil; but it has always been found that the trees extended their roots over, around, and under the stones, into the subsoil. Others have dug pits, several feet in width and depth, and filled them with rich mould. But when such pits were dug in clay-land, they could not fail to be filled with water among the mould, and which the clay would retain, so as to injure the roots of the trees far more than if no such pits had been dug, and the trees had been allowed to follow their own course in extending their roots. It was on the same erroneous principle that mounds of rich earth were raised for fences, and the thorns planted upright, three or four feet above the surface of the ground, to prevent them striking root in the cold tilly subsoil, which was imagined to be the cause of their becoming stunted in growth and covered with fog. The folly of attempting to force either trees or thorns to grow *secundum artem*, is now seen in its proper point of view, and abandoned.

Some have recommended to dig or trench the ground which the fruit-trees are to occupy, about eighteen inches deep; but if

the ground is nearly level, and the subsoil retentive, the water would remain in that case about the roots of the trees, and injure them. If trenching the ground be at all resorted to, it ought to be extended over the whole orchard ground. But if it is executed in a sterile clay-soil, resting on a tilly bottom, the better earth would be buried under a foot of barren subsoil, which would require much manure and labour to enrich; while the former soil, being buried, would soon become inert. In bare clay-land, like that of the Clydesdale orchards, it is probably the best course to dig up the soil with spades, about ten inches deep, preserve it from being buried under barren earth, and enrich it as much as possible with manure, and occasional exposure to sun and frost to render it friable.

The orchardists in Lanarkshire have relinquished the practice of placing flags under the fruit-trees; and they neither make pits, nor trench the ground eighteen inches deep, or more than ordinary delving with spades. They plant the trees only from six to eight inches deep, and raise the earth of a foot or eighteen inches round them, a few inches above their roots, to enable them to withstand the blast.

Considerable diversity of opinion prevails in Lanarkshire as to how far the fruit-trees should stand from each other; and errors have been run into both in planting too near and too sparse. In the Dalziel orchards, and some others, the rows of trees are twenty-two feet apart, and eleven feet distance in the rows. The trees in the orchard at West Brownlee are closer. In the new orchard on the estate of Wishaw, the rows are at thirty feet distance, and the trees fifteen feet from each other in the rows. On the Coltness estate, the rows are twenty-seven feet, and the trees ten and a-half feet from one another in the rows. Some, however, are sparser, and in some of the oldest orchards the trees are irregularly planted. In general, however, they are planted closer than is usually done in the English orchards. It is a common practice in the Clydesdale orchards to plant an early crop, alternately with other trees in the rows; and some plant gooseberry and currant bushes between the trees; while others [illegible] potatoes, oats, &c.

In all the Lanarkshire orchards, every spring or damp ground is carefully drained with either open or covered drains. But

in all clay-land, a covered furrow-drain ought to be formed between each row of trees. The great advantage of furrow-draining, in all heavy soils, is now universally admitted: and it seems more necessary in orchard-ground than in arable land, as the trees overshadowing the ground create more damp than when the grain crops are taken; and as the roots of trees go deeper into the earth than those of corn-plants, draining in orchards is necessary to relieve the soil of all stagnant moisture. Young fruit-trees require ropes of straw, or sprigs of broom, to be tied round them, to prevent their bark being eaten by hares. Either of these means are preferable to besmearing the trees with soot, or any other nasty substance.

After trees have been planted for five or six years, they ought to be divested of such branches as seem to point too near to the ground, and that rub upon one another. Some orchardists have attempted to train their fruit-trees so as to send out branches in every direction, and to have the tree open in the middle. This method, however, is not in every case practicable with fruit-trees, and particularly in regard to pear-trees, which frequently tower high up in the top. It is a better, and still more common, practice, to allow trees to take every one its own shape, and merely to lop off, with due caution, such branches as hang too near the ground, are too much crowded, or that rub on each other. The growth of horizontal branches should be encouraged, as the fruit ripens best when they are not too near the ground; and they are not so much shaken by the wind as branches that soar higher. Wherever blotches appear on trees, they ought to be cut off, to prevent their forming ulcers. All sorts of moss ought to be removed from fruit-trees, and the fruit should never be pulled from the trees when it is damp. It is better to take the fruit off with the hand than to shake the trees, which injures both them and the fruit. Those who purchase the fruit have the trouble of taking it off the trees; but they do not always exercise sufficient caution to save the trees from injury.

The *produce* of the Clydesdale orchards, consisting of apples, pears, plums, and small fruit, has hitherto been disposed of as fruit for family use, or sold to retail dealers in Glasgow, Paisley, Hamilton, Lanark, &c.; and part of it has often been disposed of in Edinburgh. But now that the prices of apples and pears

have fallen to less than one-third part of what they brought about twenty years ago, and from the great expense of carting fruit to market, the orchardist would do well to consider if it could not be manufactured into cider and perry. It is well known that apples raised from a clay-soil make the best cider; and from the best information I have been able to procure, from twenty-four to thirty bushels of apples yield a hogshead, or 110 gallons, of cider, the price of which varies from L. 1, 5s. to L. 2, 2s. per hogshead. In Herefordshire, twenty hogsheads of cider have often been made from the apples grown upon an English acre of land, although no more than forty trees grow on an acre. If a part of the fruit in Lanarkshire were converted into cider and perry, when the crops are most abundant, and only the marketable part of the crop, or what is known in Glasgow by the name of "shop fruit," were sold, a considerable sum might be raised by these beverages, whilst the value of the marketable fruit might be kept at a remunerating price. Should the return from cider and perry fall short of the price the fruit brought some time ago in the Glasgow market, the expense of the carriage of the fruit at all events would be saved. I understand that the whole apparatus and utensils for making cider may be fitted up for about L. 50; and that two or three of these establishments would be sufficient to bruise one-half of the fruit that these orchards produce annually.

From the vast quantity of gooseberries and currants now raised in the Clydesdale orchards, and in every garden in that country, their prices have fallen to about one-half, or two-third parts of what they brought some years ago. But as immense quantities of them are now made into jam, jelly, and wine, as well as into tarts and other confectionary articles, condiments so wholesome and palatable cannot fail to be in high request among all ranks of people. These fruit, in fact, occupy the same place in Scotland that the vines do in warmer countries. Apples and pears are eaten in France and Belgium as food along with bread of rye; and in Cornwall and some parts of England the labouring people eat fruit instead of bread or potatoes, and prefer the fruit to either of them.

Under-crops of potatoes, oats, beans, barley, &c., are raised to a considerable extent among the fruit-trees in the Lanark-

hire orchards, though not in that regular order as to be traced o any specific rotation of cropping. Potatoes with dung are generally followed by oats, and next by clover and ryegrass. Where the trees are planted near to each other, the orchard mall, and the ground steep, the ground is dug with spades or the under cropping; and even where the plough is used, hree or four feet on each side of the trees are dug with the pade, to prevent the trapping of the horses injuring the trees. After the trees have grown twenty years, milch cows are sometimes allowed to browse in the orchards. But the ground requires to be broken up, manured, and cropped, every few years, n order to enrich the soil, for the benefit of the fruit-trees, and o prevent their becoming stunted in growth and covered with noss. The tacksmen of the Cottage Orchards are bound in heir leases to manure their orchards every four years. This is necessary in the sterile grounds on which many of these orchards have been formed, and especially when the trees are young. Even in richer land, the health and fecundity of the trees are promoted by under digging, and the application of manure. The under crops themselves far more than repay the dung and abour bestowed on the land.

The *rents* of orchards vary much, not only on account of trees which have been recently planted, being of little value compared with those which have attained great perfection; but also on account of many distempers to which the trees or their blossoms are annually liable, as spring-frosts, effects of lightning, insects, &c. that it is a matter of difficulty to state, with any degree of precision, the average crops of the Clydesdale orchards. All he principal orchards are in the possession of the proprietors to whom they belong; and the only way of arriving at a correct knowledge of the crops which they yield, is from the prices obained for the fruit in a few of the principal orchards; but these prices themselves vary so very much, that the average price is not easily ascertained. Should the prices of a few of the orchards be taken for ten or even twenty years, they would not coincide with those of other orchards in their neighbourhood, he cause of such variations not being easy to be traced. Some people who have had much experience in orchard husbandry have stated, that the crop fails almost completely one year in

five or six; and that there is generally a superabundant crop of fruit once in every six or seven years. In the worst crops, some orchards, and some of the numerous kinds of fruit, will give a tolerable return; while in the best years, other orchards, and other kinds of fruit, greatly fail. Should there be frost when the early fruit are in blossom, and before the later kinds have advanced so far, either from their late nature, or by growing at a greater altitude, the early sort will be blasted, and the later will escape uninjured. The ravages of vermin are always partial and local, and the injury by electricity is still more so. The following returns, which have been realized from a few of the principal orchards, may serve to give a general idea of the crops which they yield. It may here be mentioned, that a bushel of apples weighs about 50 lb., and fetches from 4s. to 6s.

The fruit in the orchards at Camnethan Priory, the property of Robert Lockhart, Esq., and which extend to 24 acres, the trees mostly full grown, and in good order, was sold a few years ago at upwards of L. 900; but it was sold another year as low as L. 30. In general, it fetches from L. 400 to L. 600 per annum, besides a considerable portion of the best fruit being retained every year for family use.

The orchards at Dalziel House extend now to 18 acres, with 5 acres more recently planted. The fruit on about 12 acres of it was sold one year at L. 617, and the lowest sum that part ever gave was L. 100. The small fruit gives from L. 17 to L. 36 per annum, besides the value of the valuable under-crops.

The orchard of the glebe of Dalziel extends now to 5½ acres, part of it being planted only a few years ago; but the fruit growing on 3½ acres sold, a few years ago, at L. 250, and the lowest it ever gave, for many years past, was L. 82 for the large fruit, the small fruit bringing from L. 12 to L. 15 yearly, besides a moderate portion of both retained for the family.

The orchards at Mauldslie Castle, extending to 8 acres, has brought, for one crop of the great fruit, L. 500; but one year it only brought L. 10. The average price may be taken at L. 150, and that of the small fruit at from L. 15 to L. 40 per annum. One grey honey pear-tree has for many years yielded from one boll to two bolls pears annually.

Holmfoot orchard, the property of Miss Howison, extends to

18 acres, and its fruit has generally been sold at from L. 400 to L. 600 per annum, and L. 20 for the small fruit, besides under-crops.

The fruit on the lands of Orchard, about 20 acres in extent, have never been sold under L. 160; and, in favourable seasons, it has brought L. 800 for pears and apples alone.

The orchards on the estate of Brownlee, the property of James Harvie, Esq., extending to 12 acres, yielded one year for large fruit L. 567, and small fruit L. 50; but another year the large fruit brought only L. 10.

The orchard at Milton-House, the property of Captain Lockhart, extending to 10 acres, brought for large fruit one season L. 450, and another year only L. 20.

Mr Stewart of Brownlee has 24 acres in orchard, the large fruit of which brought him one season L. 700. It has often brought L. 400, and one year only L. 150; and he has drawn from L. 20 to L. 70 annually for small fruit.

Lord Belhaven's orchards at Garion, extending to 9 acres, have been generally sold at from L. 70 to L. 120 for apples and pears; but one year they were sold at L. 10. The small fruit in that orchard has brought from L. 40 to L. 55 annually.

An orchard on the lands of Dalpatrick, of 5½ acres extent, in which plums abound, has sometimes been sold as low as from L. 20 to L. 30, but often about L. 150 per annum; and one year it was sold at L. 500.

All these orchards are situated near the Clyde, in favourable soil and situation. Others, which are from 100 to 200 feet higher than the bed of the river, and the soil of which was originally a strong sterile clay, have also made fair returns, of which the following instances may serve as specimens.

An orchard at Broomleton, at least 200 feet higher than the Clyde, the property of James Gilmore, Esq., and extending to 7 acres, part of it steep ground, has always brought from L. 20 to L. 100 for the large fruit, and from L. 5 to L. 8 for small fruit annually, besides valuable under crops of potatoes, wheat, beans, oats, &c.

An orchard at Foreland belonging to Mr Hastie, and nearly 200 feet above the river, extending to 6 acres, mostly braes, and a bare clay soil and northern exposure, sold one year at

L. 9, another at L. 30, and another at L. 100; but generally the large fruit brings L. 100, and the small about L. 6, besides excellent crops of potatoes, barley, oats, hay, &c.

The orchard at Woodside, the property of Joseph Hutchison, Esq., extending to 6½ acres of strong poor clay soil, nearly 200 feet higher than the Clyde, yielded, in 1822, 100 bolls of apples and pears, which were sold at L. 6 per boll, besides that portion of the orchard occupied by Mr Hutchison junior brought L. 40, and from L. 25 to L. 36 for small fruit annually.

Of the four cottage orchards on the estate of Wishaw, the ground on one of them having been occupied with coppice-wood, which the tenant had to clear out, and to build houses for himself, paid no rent except the half of the fruit for a period of twenty-eight years. Another settlement there, extending to 6 acres, of medium or rather inferior soil, is rented at L. 15 yearly for the first four years, and L. 20 for each of the next twelve years, with the half of the fruit. Another lot of similar land, and 7 acres of extent, is let at L. 10, and the half of the fruit, on a lease of twelve years; and a settlement of 16 acres pays the yearly rent of L. 27, and half of the fruit. All these tenants build houses for themselves, and get their value at the end of the lease; and they are bound to dung or lime the land every fourth year.

About twenty-five or more of these cottage settlements have been established on the estate of Sir James Stewart of Coltness, some of them as small as 2½ acres, and others from 4 to 6 acres each. Part of them are on steep braes, and others on arable land of inferior quality, mostly strong clay, and some of them about 200 feet higher than the bed of the Clyde. The rent of the steep ground is 10s. per acre, and that of the arable land L. 1, 5s. per acre, on leases of from twenty-four to thirty years, the tenants building houses for themselves, of which they get the value at the end of the lease. They also pay for the half of the young trees, and give the proprietor the half of the fruit during the lease. Most of these cottage orchardists have done well, and every year they improve the value of their glebes. One of these glebes which extends to 3 acres, the lease of which has expired, has been let at a rent of L. 20. Others, the leases of which have run about fourteen years, have been let or sub-

let at L. 2, 10s. per acre, which is double the former rent. Some of them, which have only been about ten years under culture, would let at more than double the original rent, although the prices of all sorts of fruit have been greatly reduced within these few years.

These instances of the returns of a few of the Clydesdale orchards serve to shew, that when the greatest number of them were planted, the fruit husbandry was a profitable speculation; and that, greatly as prices have fallen, the land in orchard still brings a much higher return than it can be made to yield by any of the ordinary courses of the best conducted husbandry. The extraordinary fall in the price of fruit proceeds from various causes. A much greater quantity of fruit is now brought to market from the Clydesdale orchards than formerly. The fall in the wages and profits of the mechanics and inhabitants of Glasgow and Paisley, prevent many of them from indulging in such luxuries as they did during the late war. But the chief cause of the decline of prices is the immense quantities of fruit that are brought to the Clyde from Ireland by the facility of conveyance in steam-vessels. The only remedy against loss seems to be, to make cider and perry of the greater part of the fruit.

Apples prevail in the Clyde orchards more than pears, although the pear-trees grow well on all sorts of soil, to a greater size, are fully more productive, and more ornamental than the apple-trees; and the early kinds of them bring higher prices than apples. Plums are a valuable crop, when they succeed; but as they come very early into flower, they are often blasted by the frost before other fruit-trees put forth blossom.

The *failure* of fruit-crops proceeds from different causes. Trees, like animals, are liable to internal and external diseases. Some trees have the seeds of disease inherent in their frame, and very soon become cankered. This is the most common case with the apple-trees which are the earliest bearers, as the Hawthornden, Nonsuch, &c. Some trees derive their disease from an unfavourable soil, and others meet with external injuries, such as lightning, which often hurts not only the blossoms, but also the branches and trunks. Mildew sometimes

blasts the leaves and fruit; and many become stunted and covered with the *musci.*

But a more fatal and common disease in the Clydesdale orchards proceeds from the atmosphere, at the critical period of the blossoms expanding, or the fruit setting. A few days of dry withering easterly wind or a damp easterly *haar*, or a few flashes of electricity, at the time the trees are in flower, or when the fruit is just beginning to set, often blast the finest prospects of the orchardist. Cold rains sometimes benumb or wash away the pollen; strong winds blow it off, and sudden changes from heat to cold vitiates the fecundating matter, the farina withers in the anthers, and impregnation is prevented. Caterpillars and grubs, of the various species of the phalæna, papilio, and musca tribes of vermin, fix themselves on the buds or leaves of the trees, and destroy not only the fruit, but, like their devouring brethren of Egypt, eat up every "green thing," and render the trees, for a season at least, barren of fruit.

The most fatal enemy to the fruit in the Clydesdale orchards are the nipping frosts in spring, which destroy the fecundating matter in the flowers, check the circulation of the juices of the trees at their most tender parts, and at the most critical periods, and completely destroy the fruit for the season. The trees in the Lanarkshire orchards never fail to put forth abundance of blossom; but when the preceding summer has been unfavourable, or when the trees have been overloaded with fruit, the blossoms next year, though numerous, are either weak, or the trees want vigour to bring the fruit to perfection. Few years pass without a part of the crop being blasted by one or other of these causes; but it frequently happens that a part only of the fruit is lost by the unfavourable weather in the month of May. When the frost destroys the plums, and some of the early kinds of fruit, the late fruit sometimes escapes. These blasting frosts, however, sometimes destroy the fruit as late as the first week of June; and when they do come, the range of their injury is extensive, while that of the caterpillars is generally more local and partial.

The *advantages* and *risk* of orchard economy in Scotland may be appreciated from what has been stated in this paper. That it is a pleasant branch of industry every one will admit;

and if even half of the former prices could be obtained for the fruit, no branch of rural industry could yield a greater return. Even at present prices, the ground in orchard yields a much higher rent than it could be made to yield under any other system of husbandry. The cottage orchards on the estates of Coltness and Wishaw are neither on the best soil, nor in the most favourable circumstances for raising fruit; and yet all the tenants who have been industrious, and who have escaped particular misfortunes, are more comfortable than the generality of mechanics and labourers in either town or country. Every year adds to the value of their little glebes. Surely these cottagers are farther removed from contamination of health and morals than people of their rank of life can be in cities or towns. I repeat, that if we advert to the prices obtained by the orchardists of Lanarkshire, we will find that they draw a far higher rent for the land when in orchard, than could be raised from it under any other course of management. Even Mr Hastie of Foreland, and Mr Hutchison of Woodside, neither of whose lands were the most suitable for orchard ground or for agriculture, have generally raised ten times the rent, by their fruit, they could realise from their adjacent lands of similar quality. One of their neighbours, Mr James Holmes, had a farm on the bank of a burn, of about two acres in extent, that was not worth more than 10s. per acre; but after planting it with fruit-trees, he soon sold the fruit of it for upwards of L. 20 a-year; and when his lease expired, about fourteen years after, a rent of L. 20 was offered for the orchard, which Mr Holmes had to take at that rent, along with his farm. Few, if any, of the ministers in Scotland ever receive from L. 82 to L. 250 from 3½ acres of their glebe, besides from L. 12 to L. 15 for small fruit, as has been done from part of the glebe of the parish of Dalziel. W. A.

AN ACCOUNT OF A COMPARATIVE TRIAL OF STABLE-MANURE AND BONE-DUST FOR RAISING TURNIPS ON A CLAY-SOIL.

By Mr Henry Maxwell of Calderwood.

The following are the particulars of the turnip crop which was raised by stable-manure and bone-dust on Sir William Maxwell's property of Calderwood, this season.

The nature of the soil where the turnips grow may be described as a strong loam on a retentive clay bottom. Before draining, the field generally was very wet and sour, but a thorough application of the cross or branch drain system completely divested it of all moisture; and as the ground was ploughed and cleared under favourable auspices, the condition of the land at the time of receiving the seed was very satisfactory. It may be proper to remark, that the field, which was old lea, was drained in the beginning of 1832, a crop of oats taken off it during that season, and prepared for turnips during last spring. In addition to the quantities of manure laid on the land, as will be found in the statement below, seven and a half chaldrons of lime, of excellent quality, were applied to each acre (the Scotch). The seed, which was of the finest quality (procured from Mr Lawson), was all deposited at rather an early period. Where stable manure was applied, the braird came away at first more rapidly and vigorously than was the case with the bones; but, ultimately, the bones gained ground, and, if any thing, got rather the start of the stable manure in point of *shaw* or leaves. The whole field brairded beautifully, with scarce an exception, and the crop did not suffer in any degree from the ravages of the fly. In order to ascertain the results of bone and stable manure in regard to the produce of turnip per acre, the most accurate calculations and trials were made; and I have no hesitation in affirming the correctness of the statement in all particulars. In conclusion, I have merely to remark, that the quality of the soil is by no means particularly well adapted for turnip culture, partaking, as it does, rather too much of the clayey character, for which reason also, there is little doubt that the comparatively unfavourable development of the effects of bones as a manure is chiefly to be ascribed. As to the quality of the turnips produced, the specimens which I have sent to Mr Lawson's very interesting agricultural museum will best testify. They were carefully selected, with a view of furnishing a fair average of each description. This is the statement referred to.

Swedish—30 cart-loads stable manure, per Scotch acre, produced - - - - - - -	29 tons.
60 bushels crushed bones, per ditto, -	24
Dale's Hybrid—30 cart-loads stable manure, per ditto,	33

Dale's Hybrid—60 bushels crushed bones, per ditto, -	31 ton.
45 ditto ditto, per ditto, - - -	29
Yellow Bullock—30 cart-loads stable manure, per ditto,	29
60 bushels crushed bones, per ditto, -	28
Globe—30 bushels crushed bones, per ditto, - - -	25
25 ditto ditto, per ditto ditto, - - - -	23 ton 18 cwt.
No stable manure.	

EMIGRATION TO UPPER CANADA AS A MEANS OF RELIEVING THE PARISHES IN ENGLAND OF THEIR PAUPERS. *By Mr WILLIAM HAWKINS, Hitchin, Hertfordshire.*

Of the many points of view under which emigration may be considered, I propose to select one only for the subject of this paper, viz. its effect in disburdening parishes of their unemployed pauper population; and I shall endeavour to shew, that parishes may find in it a practical and effectual resource against that growing evil. The fact, that, in a vast number of parishes, many men are unable to find employment, and are therefore burdensome to the community, is known too widely and too well to require either proof or comment: and I think it is now pretty generally admitted that such men will be personally great gainers by being located in Upper Canada. There was certainly at one time a feeble cry against the inhumanity of tearing people from their native land; but the strong reply has been, that in Canada wages are 4s. a-day, and beef is 3d. a-pound. If parish paupers were generally acquainted with these facts, and had the means of paying for the passage, we should certainly hear very little more of a redundant population. The hungry man would want no urging to exchange his cheerless fare for beef and ale four times a day. Hopeless of improvement here, he would surely be ready enough to proceed to a spot where he may have as much fertile land as he and his children can cultivate, and a homestead filled with his own corn and cattle. And all this every industrious man may obtain for himself in Canada.

But of themselves they have not the means of crossing the Atlantic; they have not money to pay the expense. Now, if it be fact that it would be for the benefit of parishes to supply them with the means, I think it will be doing an acceptable service to both parties to prove that fact, and make it generally known.

According to the census of 1831, the population of the British Isles was found to be then 24,271,000, and was found to be increasing at about the rate of 15 per cent. in ten years. It may now be called 25,000,000, and the increase at that rate must be upwards of 300,000 a-year, or about 850 a-day. And to a country containing already a great many more people than it knows how to employ, this increase is somewhat alarming. But by what excess of births over deaths is this increase occasioned? It appears by the official returns, that in England, for every 1000 people, there have been annually 27 births, and only 18½ deaths, or, in other words, there have been three people born for every two that have died. If there had been one-third fewer births, the deaths would have balanced them, and the population would have remained stationary; but as the births bear a direct proportion to the marriages, it also appears clear that all the increase would be got rid of, if the produce of one-third of the marriages could be removed to Canada. Now I think it demonstrable that it may, and that will be "my case, my Lord," as they say at Westminster.

According to the same returns, the marriages are a little more than 7½ in 1000 people annually, one-third of which is 2½; but by the very increase of the colonies, as well as by the improvements which took place at home, there is no doubt that a small increase might, without inconvenience, be provided for within these kingdoms; and one may, therefore, safely reject the fraction, and take two marriages annually in 1000 people, as all that it would be necessary to deal with. Now, the expense of removing a young married couple to Canada need not exceed L. 25; and, therefore, for L. 50 a-year, a parish containing 1000 individuals, may boom off for ever the evils of a redundant population. It is just 1s. a-head upon any given number, and there are eleven counties in England where the expense of maintaining the poor exceeds 15s. a-head upon the population *. I have said that the increase of emigration need not exceed L. 12, 10s. a

Huntingdonshire	L.	0	15	2	Oxfordshire . . .	L.	0 17 1
Norfolk		0	15	4	Essex		0 17 2
Yorkshire		0	15	10	Suffolk		0 18 3
Wiltshire		0	16	6	Buckinghamshire . .		0 18 8
Northamptonshire .		0	16	9	Sussex		0 19 4
Bedfordshire .		0	16	11			

head for adults. I have a mass of papers before me, from many of which it might be inferred that the expense would be much less, and from some of them that it would be a little more; but the estimate on which I rely is drawn from the experience of the Dorking emigrants, and from a small pamphlet published by Government, entitled, "Information published by His Majesty's Commissioners for Emigration respecting the British Colonies in North America," and which pamphlet is sold by Knight in Pall Mall East, at 1s. 9d. a dozen.

The outlines of the estimate are as follows:

Passage and Provisions from London to Quebec,	L. 6	0	0
..... Quebec to York	1	10	0
Clothing, Tools and Utensils,	2	0	0
Pocket-money,	1	0	0
Conveyance to London, variable, but say	0	10	0
Incidentals,	1	0	0
	L. 12	0	0

London is a dear port to sail from, on account of the greater likelihood of detention by contrary winds. From Liverpool or Dublin, or the west coast of Scotland, the passage and provisions would probably cost L. 1 less, and in many cases the expense of conveyance to the place of embarkation may be nearly L. 1 more; but, in the great majority of cases, L. 12, 10s. would be sufficient to convey an adult comfortably from his own door to York, in Upper Canada. I say *comfortably*, because the passage must be made comfortable, if the system is to become popular. Certainly a man who will content himself with a bare subsistence on potatoes or oatmeal during the passage, may be freighted over to Quebec for half the money I have named, or even less; but Quebec is not the place for agricultural labourers; York is the place, and ought to be contemplated as the point of debarkation in every scheme for settling them in Canada. Let the overseers of parishes, and the proprietors of overburdened estates, calculate for how long a time they can maintain a labourer on L. 12, 10s. I think, taking the average allowance, and reckoning every thing, L. 1 does not maintain a man longer than three weeks,—in thirty-seven weeks, therefore, you give him as much to keep him in misery at home, as would provide comfortably in Canada for him and his for ever.

But it may be said that they would not be persuaded to go! If their going would be beneficial, we are not entitled to rest on that argument, till every means of persuading them has been exhausted. I entertain no doubt that, if the facts were fairly put before them, they would be "most happy to accept the invitation," and would even save something from their own scanty earnings to enable themselves to go. For the most part, the agricultural labourers have not the means of knowing the state of things in Canada, or indeed of knowing any thing else beyond the narrow round of their own employments; and it would be one of the many blessings of a sound education to save them from that despair, to which a reflection on their circumstances might be apt to depress them; and when those find neither enjoyment for the present, nor hope for the future, within the British Isles, to bid them be of good cheer, and shew them that there is world elsewhere.

Things being as they are, I should suggest that short printed papers should be circulated amongst those who can read, and that *viva voce* information should be given to those who cannot, —that a certain day and place should be fixed for the assembling of all the proposed emigrants from a particular district, so that all who were disposed to go might go together. If a vague desire to emigrate should cross the mind of a labourer, it must be repressed by the difficulty of knowing how to set about it, joined to a certain fear of throwing himself alone into circumstances so new and strange. I think multitudes would be glad to go in company with some of their neighbours, and under the guidance of some man whom they knew and could trust, who, as it is, never think of going for want of those two requisites; and it is the business of parish officers and landed gentlemen to make the necessary arrangements for removing the difficulties in question. In the absence of experience, it might reasonably have been feared, that, with all appliances and means, you could never induce men enough to emigrate to tell upon so large a number as 300,000, the amount of the annual increase; but what is the fact, and even now without system, and in the face of some hostility, the number of emigrants for the last five years has been as follows.

	To the British Colonies.	To the United States.	Total.
In 1828,	13,275.	.....	.....
1829,	15,820.	.....	.....
1830,	32,020.	.....	.....
1831,	49,864.	.....	.....
1832,	70,333,	32,980,	103,313.

I am not in possession of the returns for 1833, nor of the numbers emigrating to the United States in former years, and am ignorant whether or not that information exist any where in print; but the numbers above stated are taken from the last published tables of the Board of Trade, from which it appears, that in 1832 there went out 103,313, a number large enough to show that, under better management, parishes might find in emigration a means of relieving themselves from the greater part, if not the whole, of their unemployed, and consequently ill-fed and discontented, labourers. It is surely unreasonable to complain of an evil from which we can, but will not, defend ourselves.

If this paper should come under the eye of any body who may desire further information on the subject of emigration to Upper Canada, I would recommend him to get a pamphlet, entitled "Letters from Sussex Emigrants," which contains an appendix full of the most useful information; it is published by Longman, price 2s.; Martin Doyle's Hints on Emigration, price 1s.; and the Report addressed to Lord Aylmer, the Governor of Canada, by Mr Buchanan, chief-agent for the superintendence of emigrants in that colony. For general circulation amongst labourers, there are some tracts and papers published by the Canada Company in St Helen's Place, who furnish them gratis on proper application. There is also a number of Chambers' "Information for the People" on that subject, price 1½d., and the government pamphlet before stated, to be sold at 1s. 9d. a dozen *.

* From recent information on which we can rely, we learn that emigrants to Upper Canada who are labourers, experience many hardships after their arrival in that country, and which compel many of them who have the means to retrace their steps back to this country. Those who have no means are obliged to endure many sufferings before they can be located either as settlers or servants. We do not know whether it is their own fault or the fault of those who are in authority, that arrangements are always so long in being made for directing the poor emigrants to proper locations. The subject is worthy of the serious attention of the Government. There is no doubt, how-

By way of supplement to the paper on agricultural statistics published in the last Number of this Journal, I beg to notice a discrepancy on the subject of the poor-rates, between the report of the Agricultural Committee and the Government.

The committee say, "The average price of wheat for the year 1821 was 54s. 5d. per quarter, and the average price of the present year is 53s. 1d.; and although some of the charges connected with general taxation have been reduced since 1821, yet the local burthens, such as poor-rate and county-rate, have in most parts of England been *grievously augmented.*"

The returns say what follows. They relate to the poor rate only, because, in the official tables so often quoted, it is stated that there are no returns at all for the county-rate for any year since 1829, and that for the years 1829, 1828, and 1826, the returns are imperfect, and it is therefore to be presumed that the committee had the poor rates principally in view.

Sums expended for the Relief of the Poor in England and Wales.

Years ending the 25th March.

In 1820,	L. 7,330,256.	In 1827,	L. 6,441,088.
1821,	6,959,249.	1828,	6,298,000.
1822,	6,358,702.	1829,	6,332,410.
1823,	5,772,958.	1830,	6,829,042.
1824,	5,736,898.	1831,	6,798,888.
1825,	5,786,989.	1832,	7,036,908.
1826,	5,928,501.		

Amount for the year 1821,	L. 6,959,249.
Average of the five years ending 1832,	6,659,061.
Average annual saving,	L. 0,300,188.

To which part shall we incline, when we have "The gods on [illegible] side and Cato on the other?" I know it has been attempted [illegible] solve the difficulty, by impugning the constitution of the [illegible]. They have been called adversity men, and charged [illegible] getting up the report for the purpose of making out a case against the alteration of the corn laws; but these are all slanders, [illegible] could never be, considering what a disinterested [illegible] were on that committee.

[illegible] what were the plan of emigration for paupers, as recommended by Mr [illegible] carried into effect, that the parochial authorities in England would [illegible] the new emigrants were comfortably located before they would leave [illegible] their own country resources. Europe

ON ENCLOSURES.*

An enclosure may generally be defined, with reference to agriculture, to be a space of ground surrounded by a fence. A court-yard, a garden, or a field of any extent, surrounded by a wall or hedge of any kind, is thus an enclosure. The term is frequently defined to denote a small field, but it is always understood to be surrounded with a fence, and not left open.

The object of enclosing land is obviously protection,—a protection to cultivated plants, whether trees, grain, vegetables, or grass, against the depredations of men and animals; or a protection to, and a place of confinement for, the domestic animals. The necessity for enclosures could only have been felt after men had made considerable progress in the culture of the ground, for experience of the depredations committed by the domestic animals could alone have suggested a protection to crops.

During the pastoral state of society, when men wandered about in communities, and fixed their abode only where they could obtain pasturage for their live-stock, it is probable that their sole profession was that of shepherds. They tended their flocks and herds night and day in the country surrounding their habitations. Having become attached to a convenient spot, they would then most probably make an enclosure, suited to the number of their live-stock, near their own dwellings, to confine them during the night. This enclosure would serve the double purpose of relieving the watchful cares of the shepherds at night, and of protecting the live-stock against the nightly attacks of wild and ferocious animals.

The first attempts at cultivation by such a community, for their own maintenance, would be confined to the ground near their dwellings. No enclosure would be required to protect the crops on the ground, for the absence of the live-stock graz-

* We are indebted for this essay on enclosures, to the kindness and liberality of Professor Rennie, King's College, London, for whose forthcoming edition of Miller's Dictionary, to be published by Messrs Orr and Smith, it was written, and will appear in its proper place in that work.

ing under the care of the shepherds during the day, and the security of the fold against their straying during the night, would relieve the minds of the husbandmen from all anxiety on that head. At length the extension of culture would encroach on the range of pasture, which consequently would become more scanty. The live-stock, viewing the tempting growing crops with longing eyes, would be induced to trespass within the bounds of the cultivated ground, in spite of the watchfulness of the shepherds and their faithful dogs, whose numbers would be necessarily lessened by the demands of cultivation. A fence surrounding the whole cultivated ground, would then become a necessary barrier to overawe the predaceous propensities of the live-stock. Hence the probable origin of enclosures.

This view of the probable causes which led to the ancient mode of subdividing land, explains the origin of that particular mode of enclosing which is distinguished by the name of *infield* and *outfield*. By this mode, the distant parts of the property from the dwelling and offices of the occupiers, were appropriated in a state of pasturage to the maintenance of the live-stock: These distant parts were called the *outfield*. On the more contiguous portions of land, were cultivated the necessaries of life for the cultivator, his family, and dependents; and the fodder for the use of the live-stock in winter: These cultivated portions were denominated the *infield*. Cultivation was never practised on the outfield, and the flocks and herds were never allowed to enter the infield. A strong line was thus drawn between the professions of the shepherd and the husbandman. This system of subdividing land, by means of a single fence, into outfield and infield, originated, therefore, at a very remote period of the world; and it is a remarkable fact, that it continued to be the prevailing system of enclosing land, even in this country, where agriculture had attained comparatively an early perfection, till a little more than a century ago.

The tracing to its origin the mode of enclosing land into outfield and infield, reveals the cause which probably had the greatest power to retard the advancement of agriculture till so late a period. The distinction which was scrupulously maintained between the rearing of live-stock and the culture of grain, served to keep men long ignorant of the great facilities

afforded by live-stock to the fertilization of land. The outfield was the constant and only resort of the live-stock, while the infield was as pertinaciously devoted to the raising of corn. So long as this delusive system continued, there could be, it is obvious, no rotation of crops; and without a rotation o crops, it is a fixed maxim in agriculture, no improvement of the soil can be effected. No grass, for live-stock, was ever thought of being introduced into the infield, for the outfield was imagined to be its proper sphere. Ignorant, from want of experience, of the excellency of grass in meliorating the soil for the cereal crops, and of the efficacy of cattle and sheep in manuring the land much better than the hand of man, the agriculturists of that period never dreamed, that the food of cattle could be most abundantly and economically raised in conjunction with their own. Whenever it was discovered,—and the discovery was probably made by chance or necessity, those "mothers of invention,"—that the cereal crops became more productive, by the amelioration effected in the soil by grass; and that grass-land supported more live-stock by being occasionally cropped with corn, the whole system of outfield and infield husbandry was broken up. When the eyes were open to its defectiveness, the system, which hung like an incubus on the improvement of the country, vanished like a vision of the night. The strong line of demarcation which divided the land of the occupier into two distinctive parts, was necessarily swept away. The ancient ring-fence which only surrounded the cultivated land, was removed to the boundaries of the farm; and, in its stead, were appropriated suitable enclosures to the various crops for man and beast, which were to follow each other in regular succession. Incentives to improvement were excited through the country, by the success attending individual enterprise; and they were encouraged by the munificent rewards of public associations. Activity, skill, perseverance, began to be every where judiciously applied to the culture of the soil, and the consummation of those patriotic exertions, have been the possession of plenty, wealth, and happiness!

From what has been stated on the ancient method of enclosing land, a notion may be formed of the mode practised by ancient nations. In flat countries which are subject to the inunda-

tions of rivers, such as Egypt and India, attention was chiefly directed to the raising of corn, and not to the rearing of live-stock. Canals and ditches, for the purpose of extending the benefits of irrigation, were formed instead of fences. It is probable, that the only mode of enclosing land known in Greece, was that of the ring-fence around the cultivated ground. But if there is any doubt of the practice in Greece, there is none of that being the method practised by the Romans. The writers on Roman agriculture inform us, that enclosures were made to contain deer, wild boars, and other wild animals; but they mention none for the purpose of confining live-stock while grazing. Orchards and gardens were punctually enclosed; and Palladius recommends, that meadows should be enclosed by a wall formed of the stones cleared from the fields; but as he classes these "meadows" with gardens and orchards, it is probable they were only pieces of grass-land adjoining the pleasure-grounds, and not the fields of the farm. The alternate system of husbandry being unknown to the Romans, they never laid down the regular fields into grass or "meadows."

Most of the modern nations of Europe still enclose their lands in the ancient method. Property is so much subdivided in France by the extinction of the law of primogeniture, that no *field* enclosures are to be observed in that country,—a few march-stones, a row of trees, or particular single trees here and there, marking the boundaries of estates. Throughout Germany, Bohemia, Switzerland, Spain, and Italy, enclosures are only found near farm-houses and villages, the bulk of the corn being raised on extensive unenclosed grounds. On the other hand, the land in Holland and Belgium is in general very much enclosed, so much so, that the fields appeared half choked with hedge-row trees and hedges. The same remark very nearly applies to the south of England, where much valuable ground is occupied with, certainly beautifully luxuriant, but sadly neglected hedges. The north of Ireland is also too much subdivided, and mostly with stone walls, which are generally very unfit to detain live-stock. In the north of England, and the best cultivated districts of Scotland, that enclosures, suited to the improved state of the husbandry of the kingdom, are to be found. There, not only whole farms are enclosed, but the size of the enclosures

conforms to that system of husbandry which is suited to the nature of the soil. There, the growing crops of all kinds receive shelter from the vicissitudes of the weather, and protection from the depredations of live-stock; and the live stock themselves enjoy, as a recompense for their confinement within the enclosures, peace and plenty unmolested.

The enclosing of land being a fundamental and important branch of agricultural improvement, the general principles on which it is founded, and the best method by which it may be effected, are subjoined.

The object which first claims the attention in commencing the enclosing of an estate, is the nature of the soil. Every species of soil is improved by being enclosed. The nature of the soil fixes the system of husbandry to be adopted, and that system regulates the number and size of the enclosures. On pure alluvial clay, enclosures are not so necessary as a protection to corn from the trespasses of live-stock, on which there is only the working stock, as a shelter from the weather. Although alluvial clay deposites are situated in flat plains, sheltered with rising grounds, enclosures placed as screens against prevailing winds will improve the climate. Clay lands in the Carse of Gowrie, and similar situations, are, in fact, seldom enclosed, from an idea that the ground is too valuable to be occupied by any species of fence. This is obviously a mistaken notion, for all unenclosed fields are liable to be trespassed upon by cattle passing along the roads, and people walking across them; and the severity of the weather, particularly when windy, in some seasons at least, damage the corn crops more seriously than all the exhaustion of the soil arising from a well trimmed hedge.

Enclosures are absolutely necessary on loamy soils, of which the greatest proportion of the soil in this country consists. On these soils the finest live-stock are reared and fattened. Without enclosures it would be impossible to rear live-stock to perfection;—without them grazing animals could enjoy no rest,—and nothing hinders the thriving of cattle so effectually as disturbance when feeding or at rest.

Shelter by enclosing is also necessary for the welfare of live-stock on mountain pasture. That obtained from large masses, or even belts of planting in upland districts, improves the climate

in a sensible degree,—prolongs the duration of food, by encouraging the growth of grass both early and late in the season; and protects the live-stock from many diseases incidental to exposure in wet and cold weather. Besides all these advantages of planting for shelter, there is no improvement so obvious to the eye, and which at once enforces conviction on the mind of its utility, as the enclosing mountainous districts in a judicious and beauteous manner with planting.

Estates are numerous which contain soils both of clay and loam. When both kinds of soil occur on the same farm, a fence should be run to divide them. This division permits the enclosure of each kind according to the system of husbandry most suitable for it. The clay land can be specially appropriated to the raising of corn, while the loam is admirably fitted for green crops, grass, and live-stock. This *mixed* system of husbandry presents a strong safeguard against the fluctuations of particular seasons and markets. Should the same season not be favourable for both classes of soil, it will most likely be for one; and should the corn-markets be depressed, those for live-stock may be brisk. A happy conjunction of a variety of soils on the same farm would serve to maintain its value permanently amidst circumstances which would certainly depreciate it, were the farm only composed of one kind of soil.

Having ascertained the nature of the soils to be enclosed, and endeavoured to apportion a variety of them to each farm, the next points for consideration are the position, shape, number, and size of the enclosures to be made. These properties of enclosures depend on the nature of the soil, the aspect of the ground in regard to inequalities, and the rotation of crops suited to the soil.

The *position* of an enclosure mostly depends on the aspect of the ground, and it is ascertained by the direction of the ridges which it contains The ridges should always, if possible, run north and south, to permit both sides of them to derive equal benefit from the solar rays. On flat ground this direction may always be secured; but the inclination of uneven ground may be in an opposite direction; and as surface-water may engender more evils to land, than the solar rays can confer benefit on both sides of the ridges at the same time, the ridges should follow the

inclination of the ground, to secure the most rapid exit to the water.

The *shape* of enclosures is chiefly regulated by the nature of the soil. It is demonstrable that the shape which contributes most to economy in the labour of a moderate-sized field, is the square. Frequent turnings of the plough consume much time; but, on the other hand, an inordinate length of ridge to obtain few turnings fatigues the horses beyond their strength. The strength of a horse is, in this case, the measure of the greatest length of ridge to secure the greatest economy of labour in ploughing the field. Horses can draw a plough through cultivated ground for 250 yards, at one breathing; so that a field of 250 yards square is the shape which contributes to the greatest economy of labour in every kind of ploughing. The square shape might be profitably employed on clay lands, upon which the size of farms, and of course their enclosures, are comparatively small, on account of the large quantity of working-stock which are required to be maintained for judicious management. But a space of 250 yards square only contains about 13 acres imperial, which is too small an enclosure for land on which live-stock are reared. As 250 yards is the length of ridge most easy for the draught of horses in the plough, enclosures on loams should, therefore, be of the shape of a parallelogram, to contain the requisite number of acres; and as the direction of the ridge should be north and south, the longer side of the parallelogram should, of course, be east and west. The corners of enclosures should be right-angled, because the plough can turn over more of the earth in four square corners of a field, than in two obtuse and two acute angled corners.

It is an essential requisite in forming enclosures, to preserve those sides which run in the direction of the ridges parallel to themselves, for, wherever this parallelism is neglected, wedge-shaped ridges must be thrust in somewhere to equalize the breadth of both ends of the field; and the ploughing of these gores consumes much more time than an equal space would under other circumstances. The suitable place for these truncated ridges is on the boundaries of the farm. To preserve neatness and uniformity in ploughing fields, all the fences should run in straight lines. A fence running in a straight line on the

crown of a round-backed rising ground, affords excellent shelter on both sides. Indeed, a fence occupying elevated ground bestows more shelter to fields than in any other situation; and on that account, if other circumstances will permit it, the elevated summits of rising ground ought always to be chosen as the sites of fences. Such sites place a thorn-hedge beyond the crushing power of a heavy fall of snow. But it generally happens that the lower ends of fields cannot be enclosed in a straight line,—a rivulet or hollow between two rising grounds frequently terminating their lower ends. In that case, the fence ought to follow the course of the water or hollow ground, in order to provide an egress for the surface-water coming from both sides of the rising ground. A serpentine fence in a hollow, contrary to one on a rising ground, affords more shelter than a straight one, in the direction of the wind, which almost always takes the direction of the valley. A public road or canal passing through a property, or an old plantation growing in the middle of the land, affects the shaping out of enclosures. Whether any of them exists before or after the land is enclosed, the irregular sides of the enclosures, which alone should contain wedge-shaped ridges, should be placed next the obstacle. It may be proper here to mention, that a public road is a great acquisition near enclosures, as it may save the making of more than one private one. Easy access to and from the fields to roads, is an important means of preserving the health and strength of horses, and of saving the tear and wear of carriages and harness.

The *number* and *size* of enclosures depend partly on the nature of the soil, but principally on the rotation of crops to be adopted. On pure clay lands, devoted to the raising of corn, and particularly of wheat, the number of enclosures should correspond with the number of the courses in the rotation of crops. A very common rotation, on good clay soils, consists of seven courses, viz. fallow, wheat, barley, grass, oats or wheat, beans, wheat. Farms on clay lands are never large, seldom exceeding 900 acres. On a farm of that size, seven enclosures would contain less than 30 acres each. These 30 acres confined in an enclosure of 580 yards in length and 250 yards in breadth would constitute a very proportionably shaped field, the length being easily drawn along the 250 yards comprehend-

ing its breadth, by horses on level ground at one breathing. This clay-land farm might be divided into 14 enclosures of 15 acres each, but 15 acres is a small enclosure for a large farm, and so minute a subdivision of land, which is not destined for the support of live-stock, appears an unnecessary waste of ground by fences.

The rotation of crops followed on loams consists, generally, of five courses, and sometimes six, where much live-stock are reared and fattened. The five courses are turnips, barley and wheat, grass, grass, oats. The six-course rotation is obtained by extending the grass course another year. On enclosing land of this nature, the mere economy of labouring it is not an object of so much solicitude as the welfare of the live-stock; and as live-stock always thrives best on fresh pasture, and when few of the same kind are herded together, the enclosures should not be of very great extent, perhaps not exceeding 25, nor under 20, acres imperial each; and 270 yards, by rather more than 450 yards, would embrace an enclosure of 25 acres of a very convenient shape for grazing cattle during the summer, and feeding sheep on turnips on the ground in winter. Horses will draw the plough easier through the 270 yards of loam on level ground, than through 250 yards of clay soil; but the inequality of surface presented by loamy ground, increases considerably the weight of draught. Suppose, then, the enclosures contain 25 acres each, and that the five-course rotation is adopted, with two enclosures in each course, the farm, so subdivided, would contain 250 acres, which is as small a space of ground as the mixed system of husbandry can be advantageously practised upon. Perhaps the size of farm, of a mixed loamy soil, and under the mixed husbandry, which is the most profitable both to landlord and tenant, is 500 acres imperial, with four fields of 25 acres each in each of the courses of rotation. Placing the same kind of crop, particularly green crop and grass, in moderately sized enclosures, in different parts of the farm, almost ensures a good crop in one of the situations; and the labour bestowed on any kind of crop being for the time confined to one moderately sized field, probably secures a safe seedtime and harvest to the crop in that field; at least the risk arising from a great change of weather, which affects labour as well as crop, is avoided. Two or three small enclosures near

the farm-office, of from one to five acres each, are indispensably requisite on every farm which rears live-stock. They may be used for tups when out of season; calves when weaning from the milk; ewes when lambing; for a mare and foal for a few weeks till the mare has recovered her strength; for a stallion at grass; or as hospitals for sick and convalescent animals. Smaller farms on loamy soils than 125 acres, to save expense in working and waste of ground by fences, should only have subdivisions corresponding to the number of courses in the rotation of crops —that is five fields of 25 acres each; and should, at any time, a smaller quantity of grass or green crop be required, for a particular purpose, than the size of a field, a temporary fence can be used in preference to enclosing the farm into very small fields. Very small enclosures are unwholesome both to crops and live-stock.

Mountain pastures, which are exclusively devoted to the use of live-stock, should be enclosed in large divisions. Cattle and sheep are generally reared in mountainous districts in large numbers. Mountain live-stock possess more active habits than those of the plain; and as the herbage of the mountains is always rather scanty, they require a large space to roam over to satisfy their appetite.

Access to good water should never be overlooked, though it too often is, when land is enclosing for live-stock. Should a rivulet not be within reach, spring water should be obtained for cattle, either by sinking wells or laying conduits and pipes. The best pasturage as food will never improve the condition of cattle, without the digestive aid of plenty of good water. Without an abundant supply of water, fields of the best grass will never be taken by graziers for grazing cattle, though they may answer for sheep.

The advantages of enclosing land may thus be summed up. Enclosures shelter corn against the inclemency of the weather, and they prevent the trespasses of men and animals. They not only afford the most excellent shelter to live-stock, but they insure them peace and protection while feeding, or when at rest. They enhance the value of land in every situation; and they greatly beautify the appearance of a country. They confer ease of mind to the farmer by securing his crops, and flocks, and

herds, from danger; and they impart confidence to the country gentleman, that the enclosing of his estate of land and wood will continually improve his means, so long as he continues to protect it by maintaining the fences in an efficacious manner.

THE PRINCIPLES WHICH REGULATE THE TREATMENT OF SIMPLE WOUNDS, CONSIDERED WITH REFERENCE TO VETERINARY PRACTICE. *By CHARLES WILSON, M. D. &c. Physician to the Kelso Dispensary.*

THERE is no subject a knowledge of which is more extensively required, and yet more sparingly disseminated, than that of the right method of treating wounds occurring to the lower animals. It might have been expected that the instructions of the able leading professors of the veterinary art would have had some considerable effect in directing the practice of their inferiors and their disciples; yet it does not admit of denial, that every day instances occur of the most extreme ignorance and mismanagement in the cure of those ordinary accidents, the daily occurrence of which ought to point them out as objects deserving the minutest study and attention. It is true, that many of these accidents are of so trifling a description, that nature is easily enabled to effect a cure, either with the aid of the farrier, or in spite of him; but there are others in which his misdirected efforts are often productive of the most hurtful effects, and it requires little experience, in such matters, to discover instances in which some noble and useful animal, whose unimpaired powers a scientific application of remedies might have preserved, has been consigned by ignorance to the kennel, or, at the best, has become the maimed tenant of the paddock, for the remainder of a painful existence.

Yet it would be unjust were we to throw upon the veterinary practitioner the discredit of having first suggested the worse than inefficient plans of treatment, of which there is so often reason to complain. It must be confessed, that nearly all his notions of practice on the subject have been borrowed from human surgery, as it existed at a remote period, before it had undergone that process of depuration which has since raised it al-

most to the level of the exact sciences. His fault has been that of remaining contented with such knowledge as was first proffered to him, thus failing to keep pace with the march of that science which he had necessarily assumed as his guide. It seemed, in truth, to be the main object of the earlier of the modern writers on surgery, to give dignity to their art, by involving every subject in the greatest possible number of difficulties, making each a theme for a host of nice distinctions, founded upon any thing but sound views of the healthy or diseased actions of the human frame; by combining their remedies in such a way, as to render it frequently impossible to detect their precise results; and by loading their "armamentum" with a variety of unwieldy and complicated instruments, better adapted for entrapping the admiration of the ignorant, than for affording real assistance in the cure of disease. The treatment of wounds suffered, in an especial manner, from the now disused doctrine of the humours; the alleged changes of which, in point of quantity and quality, and the variations even in the form of their component particles, such as it was imagined might take place, from round to angular, &c., were held to perform a considerable part in all cases of diseased or irregular action. Hence arose the supposed necessity of softening, breaking down, concocting, and digesting these humours, in cases of external injuries, to effect which the sanative powers of nature were too often interrupted and set aside, and the process of cure by the first intention, in many instances neglected, in order that recourse might be had to a strange medley of applications, the greater number of which modern science has at length wisely rejected. But we have only to turn to the common works on the veterinary art, or, still better, to watch the practice of the village farrier, to discover, that, although many of the mistaken physiological notions on which the ancient plan of cure was founded, have fallen into neglect; yet still the practice itself has been retained, and is now followed, in the purest spirit of empiricism, by those who neither know its origin, nor understand its aims. If the succeeding observations shall be found to have any tendency to diffuse more correct notions with regard to the management of the common class of accidents to which they refer, the object of the writer will be fully accomplished.

The importance and danger of wounds, of course, vary according to the nature of the parts involved. If the skin and cellular substance only be injured, the recovery is generally easy and prompt. Division of the muscular fibres, with the necessary concomitant of lesion of the smaller arteries and nervous trunks, may oppose more obstacles to the cure, but neither are these often of a serious description. But should any of the greater arterial or venous trunks be opened, any of the cavities of the body be penetrated, or the internal organs share in the injury, a wound must be considered as presenting tokens of immediate and extreme risk. One of the results of every wound, unless where it affects a part not naturally endowed with sensibility, as the horny crust of the hoof, is a sensation of pain. Farther, as all the organs admit into their texture a greater or smaller number of vessels, no wound can occur without an effusion of some portion of the circulating fluid. And, lastly, the greater part of the tissues of the body being endowed with some share of contractility, whether animal or organic, another general result of a wound is a separation of its sides, to an extent proportioned to the magnitude of the injury, and to the degree of contractile force possessed by the part which has suffered lesion.

Nature establishes the cure of wounded parts in two ways. The one process is that of immediate adhesion, which is accomplished in a few days, when the wound is technically said to have been united by the first intention. The other is by the slower means of suppuration and granulation, through which the wound is gradually filled up, and a cicatrix ultimately formed; the process being then entitled the cure by the second intention. It will be necessary to give some account of the nature of these processes before proceeding to enter more fully into the consideration of the different descriptions of wounds, with their appropriate methods of cure.

The conditions which are favourable to the healing of a wound by the first intention are, rest, approximation of the divided surfaces, cessation of hemorrhage, and seclusion from the contact of the air. These conditions being obtained, there follows, for a few hours after the accident, a discharge from the wounded vessels of a serous or watery-looking fluid, which then changes into an effusion of what is termed coagulable

lymph. This substance displays a strong tendency to organization, and being gradually thickened by the absorption of its thinner parts, it serves as a glue, to bind together the cut surfaces, which is generally accomplished at the end of two or three days, though the union be not as yet firm and perfect. Through this lymph the bloodvessels prolong themselves, and the organization of the new matter being at length fully established, the cure may be said to be completed, the whole process usually occupying less than a week. For the success of this process, a degree of increased action in the parts, denoted by slight heat and redness, is required; but this increased action ought not to amount to inflammation, or, at least, the inflammation must be to a very trifling extent, otherwise the cure will be greatly retarded, and must be finally completed by the second intention. If, on the other hand, there be a deficiency of action, the healing process ceases to go on, and the wound assumes the appearance of a callous fissure, giving origin to a thin watery discharge. The cure by the first intention is that which ought to be attempted on every occasion, where there is the slightest prospect of its success, as it may be effected with great expedition, and presents a small scar, the part remaining clothed with original skin, a covering much better than any substitute which can be formed to supply its place.

But if it should prove impossible to attain the conditions necessary for completing the union by the first intention, we must look for the appearance of a different series of phenomena. The pain arising from the injury continues and increases in severity, and towards the beginning of the second day after the accident, other symptoms of inflammation show themselves, such as increased heat and redness, with swelling of the parts closely adjoining. The discharge is at first thin, and nearly colourless, though sometimes tinged with blood, and afterwards the surface becomes covered with an effusion of lymph. About the third day there begin to display themselves, a number of minute red-coloured cones, soft, and bleeding on the slightest contact, which denote the commencement of the process of organization in the effused lymph, and are known by the name of granulations. These, on being subjected to maceration, appear to be composed merely of cellular tissue, and do not present any

analogy, in point of structure, with the particular organ from which they proceed, or of which they are henceforward destined to form a part. In the mean time, the discharge becomes opaque, and of a yellowish-white colour, possessing the other properties of what has been termed purulent matter, and becoming thicker, more viscid, and of a purer white, as the cure advances. The process of granulation now proceeds, until the whole cavity of the wound be filled with the newly generated substance. A thin blue pellicle is then observed at the edge, which increases in breadth, and proceeding from the circumference to the centre, gradually completes the covering of the wound. During this period, the sensibility of the wounded part decreases, and the heat and painful distention disappear as the inflammation subsides. The newly formed cellular tissue acquires a contractile power, by which the wound is curtailed in its dimensions, and the divided surfaces are brought closer together, the bond of union putting on finally a fibrous appearance and consistency. Lastly, The new-formed skin, from being of a blue colour, delicate in its texture, and highly vascular, becomes changed into a dense, firm, and almost insensible substance, contracting at the same time its dimensions still farther. With this concludes the healthy and natural process of cure by the second intention, which, it may be observed, admits of division into three stages, —those, viz. of inflammation, usually in large wounds accompanied by general sympathetic fever, and lasting from three to six days; suppuration, the duration of which is irregular; and cicatrization, by which the healing of the wound is at length fully accomplished.

A mild degree of inflammation necessarily, as we have seen, accompanies the process of granulation and suppuration; but should this inflammatory action run to excess, or become deficient, the cure is alike impeded. Hence we have wounds which are prevented from healing by excess of action, and wounds whose cure is impeded by defect of action; or, as every wound secreting matter may be considered as an ulcer, we have what are termed *irritable* and *indolent* ulcers. The *irritable* ulcer is attended with acute pain. Its surface is sometimes whitish or ash-coloured, but oftener of a brownish-red. There are no distinct granulations, the margin is abrupt and irregular, and the

discharge is thin and serous, often tinged with blood, and frequently so acrid as to excoriate the neighbouring parts. Irritable ulcers occur in subjects whose powers of life have been too highly fostered, and in animals of a delicate and susceptible habit of body. They are also frequently the effect of improper treatment, such as the application of substances too strongly stimulant, the use of undue pressure of straps or bandages, or want of cleanliness. The *indolent* ulcer, more rare in animals than the former, is distinguished by its thick, smooth, and callous edges, which cause the sore to wear an appearance of great depth. Its surface is smooth, glistening, and destitute of distinct granulations, varying in colour, but generally dark grey, or brownish. The discharge is viscid, and usually adheres tenaciously to the surface of the sore. It is often accompanied by a considerable degree of swelling. Neither of these ulcers show any tendency to cicatrize, until the nature of their action undergo the necessary change into what constitutes the condition of the simple healthy ulcer, such as has already been described while detailing the process of cure by the second intention. Ulcers of long standing are apt to assume the indolent form, and in this state are found to be of very tedious and difficult cure. We should also notice, that certain disordered conditions of the system tend to delay the healing of wounds. These will, of course, require to be watched for, and obviated where possible. The state of the digestive organs, in particular, will often demand a careful attention.

Such are the details which it has been considered necessary to give with reference to the natural process of healing wounds, and to the conditions opposed to its success. It will be requisite that they should be kept in view during the perusal of the succeeding pages; because upon them, as affording the only proper guides to a rational and scientific practice, the principles of treating the various kinds of wounds now to be described, will be found to be wholly grounded. Nature has already been too frequently outraged by the ill-judged interference of the groom and the farrier, who should be contented to walk more humbly in her train, striving to distinguish her methods, and rendering their plans of treatment subservient to her aims.

Wounds receive their most common and appropriate classifi-

cation from the different manners in which they have been produced. We have thus (I.) *Incised* wounds, or such as have been caused by instruments having a sharp edge or point; (II.) *Contused* wounds, or such as owe their origin to contact with bodies which act only by their mass, or by the swiftness of their motion; or, if at rest, by the resistance which they offer to the motions of the animal; and (III.) *Lacerated* wounds, where the tissues of the body are subjected to too high a degree of tension, to which they yield, and are forcibly torn asunder.

I. Incised Wounds.—An incised wound is one of the most common accidents to which the lower animals are exposed, and presents itself in a considerable variety of forms. These will admit of being reduced to three principal divisions, viz. (1.) The *simple incised* wound, which is susceptible of cure by the first intention; (2.) The *suppurative* wound, which can only be healed by the process of granulation and cicatrization; and (3.) The *punctured* wound, which differs from the others by its breadth being small in proportion to its depth, and which admits of cure sometimes by the first, and sometimes by the second intention.

1. *Simple Incised Wounds.*—The great object, in all cases of simple incised wounds, ought to be to attain an union by adhesion. Some veterinary surgeons tell us, that, in the lower animals, and especially in the horse, it is impossible to achieve a cure by the first intention. They would have spoken more correctly, had they contented themselves with maintaining that such a cure was often a matter of difficulty. Daily experience shows instances of the wound attending bloodletting being united without the formation of matter; and Blaine, with every other veterinarian of eminence, admits the possibility of thus healing far more extensive injuries. The experiments of Duhamel and Hunter shew even that portions may be entirely removed from one part of the animal system to another, and yet perfect adhesion be obtained. Yet it must be allowed, that a considerable obstacle to the success of this process of cure is found in the strong tendency to inflammatory action which seems to characterize the horse; and a still greater obstacle in the restlessness of the animal, and the difficulty of subjecting him to due control.

But the proportion of successful cases has been too great, where the immediate union has been judiciously aimed at, for the practice to be allowed to fall into disuse; and the attempt may always be attended with this satisfactory assurance, that, even in cases of failure, matters are placed in no worse condition than before, as the cure by the second intention still remains open to us, and what would otherwise have been our first resource may be accomplished still with the same ease as formerly, while the chance of doing better has not been neglected.

As a curious instance of the successful termination of a severe wound occurring to one of the lower animals, which we believe, taking all its circumstances into consideration, has no parallel in the annals of human medicine, the following is quoted on the authority of M. Fromage de Feugré. A dog was thrown from a window in the second story of a building, into the street. The animal seemed to have much pain in the right fore-leg, but no fracture could be detected. For a long time he remained unable to use the limb, and at length, its recovery being despaired of, recourse was had to amputation. This was effected by what is termed the flap operation at the shoulder-joint. Two arteries were tied, the whole operation having lasted several minutes. M. Fromage then placed the dog standing on the ground, in order that he might wash the wound, and apply the necessary dressings; but as soon as the animal felt himself at liberty, he ran off, and moved with such agility, that for upwards of three weeks no one was able to lay hold of him. Being then caught, it was found that the cicatrix was perfect, and so uniform, that (says our author) it might have been believed that the animal had been born with only three legs; although, of course, the wound had never been subjected to any treatment, but had been left, and that under circumstances highly disadvantageous, solely to the resources of nature.

No wounds can be said to be capable of union by the first intention, excepting such as are recent, and whose margins can be brought into close approximation. The first care, in dressing a wound of this description, ought to be directed towards ascertaining its extent and depth, and the precise nature of the parts involved, by gently separating its sides, washing away the blood by which it is covered, and removing all foreign substances, such

as sand, &c. should any be present. The use of the probe may sometimes be necessary, but should be always sparingly applied. The two sides of the division must then be brought into contact, and so carefully retained. For this purpose, in very slight cases, where the injury extends only to the skin, or to the tissues immediately subjacent, the use of adhesive plasters, either alone or aided by the uniting bandage, may be sufficient; and, in such cases, they ought to be preferred; but it will be generally requisite, in considerable wounds, that one or more sutures or stitches should be employed. What is termed the interrupted suture is that usually resorted to, and is performed by means of curved needles, armed with silk, common thread, or fine tape. The needle should be passed from without inwards, at some distance from the margin, and down to near the bottom of the wound, and the one lip being thus penetrated, it must be carried through from within outwards. The sides of the wound must then be brought together, when the ligature may be tied, and its ends cut away. If the wound be extensive, more than one stitch will be required, but they should seldom be nearer each other than an inch. The suture generally ulcerates out about the third or fourth day. Sutures ought not to be applied where the wound is of great depth, or where they would be required to traverse the substance of a muscle, as, in such cases, they cannot be fixed with sufficient firmness, and would besides be a source of great and constant irritation to the contractile fibre. Where the suture has been applied, the use of strips of adhesive plaster, made of diachylon, and spread upon leather or strong cloth, will be advantageous in affording support to the stitches, while they remain attached, and in supplying their place should they have ulcerated out, or been removed on account of their exciting too high a degree of action, to which they sometimes give rise. In order to fix the plasters, the sides of the wound should be shaved or closely shorn, and the strips applied of sufficient length to pass beyond the reach of the exuding moisture, a small space being left between each, corresponding to the place occupied by the ligatures, by which means a free egress will be allowed to whatever matter may proceed from the wound,—a point which ought always to be attended to, whether the strips be used along with the suture or

alone. The whole should be covered by a proper light bandage so as to exclude completely the contact of the air.

The application of bandages is a subject well worthy the attention of the veterinary student, as much may be accomplished by their aid in the cure of wounds. Indeed, in favourable situations, they prove often sufficient of themselves to maintain the divided facts in due approximation, so as to set aside the necessity of having recourse to either stitches or plasters, with which, especially the former, it should always be the object of the dresser to dispense, where possible; and that more particularly in examples where there is reason to dread an access of high irritative or inflammatory action, which such applications have naturally a tendency to provoke or increase, though not, by any means, in an equal degree. Bandages for the purpose of promoting union can be conveniently applied in most wounds of the extremities, and sometimes in those of the head and trunk, while in injuries of the haunches, the buttocks, the shoulders, the breast, the stifle, the flanks, &c., they are of difficult application, and can only be employed as a covering to the part, without at all conducing to the union of the wound by keeping its sides in contact, which must be left to be accomplished by the other means described. The form of the uniting bandage necessarily varies according to the direction of the wound, whether it be longitudinal, transverse, or oblique. When it is desired to draw together the margins of a wound running parallel to the long axis of the limb, the bandage is composed of a single piece of cloth, of a length and breadth proportioned to the extent of surface to be covered. In the middle of this a longitudinal slit of wo or three inches in length should be made. The bandage nust then be rolled up at both ends, and the slit being applied ver the wound, one of the rolled ends should be passed round he limb, and through the slit, when, by pulling the ends, the hole cut surfaces are approximated; and by passing the roller nce or twice round the limb, and securing its extremities, the arts are retained and supported in the proper situation. Before applying the bandage, a light soft pledget, thinly smeared with simple ointment, should be laid over the wound, and a compress placed at a little distance on each side. These compresses [illegible] the principal part of the pressure from the bandage,

nd will serve to direct it so as to push together the parts at the ottom of the wound. The bandaging of wounds whose direction s transverse or oblique to that of the limb becomes a process of reater difficulty, and we fear that its complicated aspect will be ound sufficient to deter many from the trouble of attempting it. But as there may be cases in which the anxious proprietor of a aluable animal may rightly consider, that scarcely any degree of abour and attention can be ill-bestowed in preserving its soundness nd handsome appearance, we subjoin the following directions. For the transverse or oblique wound, two compresses and two olled bandages are required. One of the compresses should be ormed of a piece of cotton or linen cloth, as broad as the wound s long, and folded to a convenient thickness, but having one of ts extremities left free, which should be divided into several slips. This should be applied above the superior margin of the wound, n a line parallel to its direction, and fixed there by several urns of one of the rolled bandages, which should be continued lown to the edge of the division. The other compress is to be ormed in the same way, with the exception, that instead of the ree extremity being divided into slips, it should be perforated y a number of holes corresponding to the strips of the upper one. This compress must be applied below the lower lip of the wound, nd secured there by several turns of the second roller. A soft ledget, thinly covered with some simple ointment, such as the ommon or Turner's cerate, is then to be laid over the wound, nd the strips of the upper compress being passed through the penings in the lower one, the two ends are to be pulled in opposite directions, by which means the whole divided survaces vill be brought into exact contiguity. The ends of the compresses should then be laid flat along the limb, and held by an assistant until they are fixed by continuing the turns of the rollers, between which they should be several times folded for the ake of greater security. Lastly, the ends of the rollers are to e fastened by pins or by a few stitches at the lower part of that livision of the limb which has suffered the injury. The uniting andage should be applied sufficiently tight to ensure its reaining its situation, but not so as to cause any considerable degree of constriction to the limb.

The precise method, therefore, to be employed in dressing a

fresh incised wound, with retracted edges, must be adapted to the particular nature and situation of the injury. If the uniting bandage can be applied so as to keep the edges of the wound in contact, it ought to be preferred as the least irritating dressing. Where its use is not likely to be attended with advantage, the strips of adhesive plaster come next in order as fitted to promote the sanative union, but it is only, as has been previously remarked, in slight cases that their unassisted use is likely to prove efficient. The suture, again, must be had recourse to, only where the other methods are insufficient or inapplicable; but the stitches, in large wounds, should be always assisted by the use of plasters, for reasons already noted. It is scarcely necessary to add, that wherever one kind of dressing can be made to assist another, they ought to be combined as circumstances may admit or require.

The host of stimulating applications, such as the various balsams, acrid saline solutions, woundstones, (usually prepared by fusing together one or more of the caustic metallic salts) &c., so frequently recommended for their healing virtues, are all of them more or less productive of effects opposed to the success of a cure by the first intention, and should therefore be laid wholly aside in the treatment of the simple incised wound.

The proper method of removing the dressings is a matter scarcely less worthy of attention than their first application. It will seldom be necessary to attempt their removal before the second, or, more frequently, the third day after the injury. Care must now be taken not to expose the animal to unnecessary torment, or the still imperfect cicatrix to risk of damage, by hasty or violent handling. Let the dressings be softened by tepid water where they adhere through the hardening of effused blood or matter; and where plasters have been applied, they should be removed by raising their extremities, and pulling them from each side towards the line of the wound, so as to avoid all danger of re-opening its cavity. Long exposure and much handling of the wound should be avoided, and the probe must be sparingly used, if used at all, which will seldom be necessary. Where stitches have been employed they should be divided and removed, if they have not already ulcerated out; and the precaution of applying fresh strips of plaster before detaching the stitches may often be adopted with propriety, as a means of insuring constant support,

where it is feared that the cicatrix is still destitute of sufficient solidity to maintain its union. The injured parts should be lightly washed before the application of fresh dressings, as want of cleanliness will often prove a serious obstacle to the cure. The intervals which ought to elapse between the subsequent dressings must be regulated by circumstances. It is seldom that they can be required oftener than once in the twenty-four hours; and where the process of union has gone on successfully, even this need not be long continued, as the cicatrix will speedily acquire that degree of consistence which renders it independent of extraneous support; at which period the cure of the wound may be considered as complete. The success of the plan which has been detailed is not likely, in moderately favourable instances, to disappoint our wishes, but if, after exposing it to a fair trial, it be found that the wound shews no decided tendency to unite, it will then become necessary to refer our farther treatment to the methods to be described under the next subdivision. The injury must now be healed by the slower process of suppuration and granulation.

2. *Suppurative Wounds.*—Wherever the margins of a wound cannot be brought into close contact, and its surface covered by sound integuments, there can be no hope of a cure excepting through the medium of the suppurative process. A wound may be in this condition either through a loss of substance which may characterize the injury, through neglect in the first treatment, or through such conditions of the general system, or of the parts injured, as are known to be unfavourable to the adhesive union. But we shall, perhaps, best exemplify the method of treatment which seems to recommend itself most to notice as founded on right principles, by following out a case in which it may be supposed that the union by the first intention has been attempted, and has not been attended with success. In this way the general rules of treatment, which are sufficiently simple, will be developed, when their special application to individual cases may be left with safety to the judgment of the student.

Recalling, then, what has been formerly said of the effects of excessive or deficient action, our first object will be to inquire whether the delay in the healing process can be attributed to either of these states. If, as frequently occurs, the union be

impeded by an excess of what may be termed simple, healthy, inflammatory action, evinced by considerable swelling of the parts adjoining the wound, and by the prominent, firm, and vividly-red appearance of the granulations on its surface, this will ordinarily be best allayed by the use of warm fomentations or poultices; while, in some cases, it may be necessary to have recourse to general or local bloodletting, and a restricted diet: and, on the action being subdued to its proper pitch, dressings with simple ointment, repeated daily, will serve to complete the cure, or, where the margins admit of being approximated to a certain extent, though not wholly, the adhesive plasters may be used. It is impossible to reprobate too strongly the shameful abuse of caustic and irritating applications to wounds in this condition, and indeed to all wounds, which constitutes the ordinary practice of the many uninstructed persons who have been so long permitted to maim and torture the best friend and servant which man has been enabled to select from among the lower animals. There is now lying before me a volume, widely circulated in this district, which recommends the liberal use of such substances as blue vitriol, nitric acid, and oil of vitriol, in recent wounds, and which advises the injection of the same acids, mixed in high proportions with spirit of wine, into penetrating wounds of the joints! In other cases of recent injury, verdigris, mixed with melted resinous ointment, is poured warm into the bottom of the wound, which is actually directed to be stitched over this vile composition; and should any inflammatory action follow, as follow it must, similar applications are advised to be employed with redoubled assiduity! That these and similar counsels are in no want of agents to put them in force, I have had many opportunities of observing. It is to be hoped, however, that the time is not far distant when such disgraceful mal-practices shall be wholly unknown in our stables.

But if the excessive action be of that kind which leads to the constituting of what we have described as the *irritable ulcer*, the ordinary causes of which have already been narrated, a more serious obstacle will have been placed in our way, demanding a more patient perseverance in the treatment. Our object must, of course, be to reduce the morbid state of excitement in the parts to the just standard, and to effect this, sometimes cold

and sometimes warm applications have been recommended. The warm applications are likely to suit the greater number of cases; and they may consist of fomentations with decoctions of chamomile flowers or poppy heads, and emollient poultices. The fomentations should be repeated at least twice daily, morning and evening, for half an hour at a time, and the sore should be covered during the intervals with warm poultices, frequently renewed, composed of sifted oatmeal, turnips boiled and bruised, or linseed meal, with the addition of a little lard or oil. When the irritability lessens, and healthy granulations begin to cover the sore, a piece of soft dry lint may be placed between it and the poultice, and as soon as the ulcer wears that appearance which has been described as marking the progress of healthy granulation and cicatrization, the poultices should be discontinued altogether, as the action of the part must now be considered as proceeding within due bounds, and the farther use of emollients would be apt to induce the opposite condition of deficiency of excitement. The farther treatment will consist of the simple dressings formerly recommended; and the aimless use of acrid stimulants is to be deprecated here as formerly. Let it never be forgotten, that every wound wearing the aspect of healthy suppuration, tends to cicatrization of its own accord; and that it becomes our duty, therefore, merely to watch Nature, with the view of ascertaining that no obstacles are placed in the way of her operations.

Should the action, on the other hand, be deficient, we shall have presented to us those appearances of the injured part which has been described as constituting the *indolent ulcer;* or, should the action have suffered diminution in a small degree only, we shall find the sore presenting pale and flabby granulations, endowed with little heat and sensibility, and having little tendency to cicatrize. To remedy either of these conditions, we must now have recourse to stimulating applications, such as the common resinous ointment, &c., or lotions composed of camphorated spirits, or of some of the warm tinctures. The repeated moderate application of lunar caustic will often be found highly useful in this kind of sore, and washes composed of white or blue vitriol in solution may sometimes advantageously supply the place of the spiritous lotions. But never, even in this condi-

tion of a wounded part, should the sore be crammed with powdered blue vitriol, verdigris, or similar substances, as we find sometimes recommended. Ever studious to avoid extremes, the stimulus should be applied so that its effects can be wisely regulated, and stopped as soon as the appearance of the surface indicates that we have attained that due medium of action which shews that the wound is of itself tending to a cure, when we must again have recourse to simple dressings. As the indolent condition of wounds is one which is not commonly observed in the sound horse, but seems rather to be the attendant on injuries occurring to such animals as are of a sickly habit, as are tainted by glanders, or whose constitution has been enfeebled by improper food, or by any considerable evacuation, regard must be had to the state of the general health of every individual under treatment, and such remedies applied as each particular case may demand or admit. In all conditions of wounds, we repeat, the use of bandages, modified as may be necessary, is advantageous, either with the view of serving as active agents in promoting the cure, or merely as coverings, excluding the contact of the air, which is always observed to cause a state of irritation and dryness in sores exposed to its effects, such as is extremely unfavourable to the establishment of a healthy suppuration. The proper application of bandages in wounds where there is a prospect of cure by the first intention, has been already minutely detailed. In suppurating wounds, with excessive action, they should be applied loosely, as the parts would then suffer by constriction. In such as shew deficient action, a moderate degree of tightness is advisable, and often of great service. In the healthy suppurating wound, the bandages should not exercise greater pressure than is sufficient to maintain them in their place.

3. *Punctured wounds* are generally produced by the animal coming into contact with the prong of the common stable-fork, a nail, or a sharpened stake; but of course they may be the effect of a thrust with any pointed weapon. A simple punctured wound which has not injured any important internal organ, or penetrated any of the cavities of the body, is usually of easy cure. Much, however, depends upon the nature of the instrument by which the lesion has been effected. If it have been caused by a narrow weapon, having a very sharp point and polished sides,

we may look with some confidence towards obtaining a speedy union by the first intention; but should it have been the consequence of a weapon, whose obtuse point and ragged edges do not permit it to penetrate without the exercise of considerable violence, the cure will be likely to be more tedious and more difficult, and will usually be concluded only through the medium of the suppurative process. One of the first points which ought to be ascertained, before proceeding to dress a punctured wound, is the precise direction of the injury; and whether or not its orifice be at its lower or most depending part. It should also be our endeavour to discover whether any of the membranous fasciæ, or sheaths by which the muscles are surrounded, have been penetrated, as such a lesion often gives rise to high inflammatory symptoms, requiring special interference in the after treatment. But, whatever be its precise nature, we believe it will always be prudent to attempt, in the first place, a cure by the adhesive union. Some veterinary surgeons, of deserved eminence, recommend that, in every case of this description, especially where the injury is of considerable depth, the external opening should be enlarged, so as to give the wound a conical or funnel shape, thus affording free issue to any discharge of blood and serum, and preventing constriction of the parts on the occurrence of the usual inflammatory swelling; the wound being encouraged to go on to suppuration. This, however, is a measure which it would perhaps be wiser to delay, until it may be called for by the actual approach of the circumstances which it is intended to obviate, but which may chance never to occur. It will be better, therefore, to commence our treatment by the application of adhesive plaster, if there be any retraction of the edges of the orifice; or, where the wound is close, a piece of soft lint should be secured over it, by a soft compress and bandage. If the wound be severe, the animal may be bled, and a laxative dose administered, as precautionary measures. About the third day, or sooner, if the horse appear feverish and restless, the injury should be examined. If every thing have proceeded favourably, the wound will be found to have adhered, and a little further time and ordinary care will be all that is necessary to establish the cure. But, if the parts inflame, and the animal winces much under pressure, shewing the presence of severe

pain, it will be proper to have recourse to warm emollient poultices, repeated every three or four hours, and to fomentations with warm water, or with a hot solution of sugar of lead, which should be employed each time the poultice is renewed. Should the wound go on to suppuration, it is to be expected, in cases where the injury has not been inflicted in a direction from below upwards, or where the orifice does not form the most depending part, that we shall have collections of matter, which in such cases cannot attain free egress, and which may extend under the membranous sheaths before alluded to, giving rise to the formation of troublesome sinuses. To prevent this, as soon as the actual presence of matter is detected, it should be evacuated by a free incision. The poultices are then to be continued till the action appears to confine itself steadily to the healthy standard, when the cure may generally be completed with the aid of simple dressings.

II. Contused Wounds.—Wounds of this description are produced by violent blows with a blunt instrument; or, more frequently, by the horse, while, in swift motion, being brought into contact with an obtuse object. The contused wound is generally of an irregular form, its margins appearing unequal and ragged, and not unfrequently presenting flaps partially torn away from the neighbouring parts by a degree of force which leaves them bruised and feelingless, and sets aside all hope of a cure by adhesion. This kind of wound usually leads to the development of high inflammatory action, during the suppuration consequent upon which, such portions of the bruised parts as have been too much injured to retain their vitality, are thrown off, leaving a vacuity which is to be covered by the formation of granulations and a cicatrix. In slight cases, however, it is possible that the lesion may not have gone to so great an extent, and that there may still be some prospect of a complete, or, at least, a partial union by the first intention. In any case, it will be proper to bring the divided surfaces into as close contact as possible, placing over them the usual simple dressings, lint, compress and bandage. It will rarely be advisable to have recourse to the suture, as it would be apt to provoke that intense degree of inflammation, which, in such wounds, we have especially to fear,

but strips of adhesive plaster may often be advantageously applied. Acting thus, even if we do not succeed in obtaining immediate union, we are at least likely to render more moderate the after effects, and to hasten a cure. As soon as any active inflammation shews itself, we must at once take off all pressure of plasters, &c. from the wound, and commence the use of poultices; the rest of the treatment being to be conducted on the plan recommended for suppurative wounds. In this class of wounds we must be especially prepared to expect the occasional appearance of symptomatic fever, which must be met as usual by bloodletting, laxatives, and restricted diet.

The division or abrasion of the skin constituting the "*broken knee*," caused by the falling of a horse, is a frequently occurring example of a contused wound, and may merit especial notice. As the scar left by a wound in this situation is always held to be a great blemish, and usually diminishes to a considerable extent the value of a horse, even when the fall which caused it may have been by a mere and solitary accident, the healing of such a wound, however trifling it may appear otherwise, becomes a matter of some importance. The first step to be taken after its occurrence, should be to wash it carefully with tepid water, in order to remove the particles of sand which usually adhere to its surface. This accomplished, the sooner it is protected from the action of the air the better, as there will be less risk of subsequent inflammation. Where the wound is gaping, having retracted edges, the owner of a valuable horse will do well to have the hair removed by a skilful hand, to a considerable distance above and below the injury, so as to admit the application of a long strip of plaster, by means of which the margins may be brought together, and retained in contact. Over this, dry lint, a soft compress, and a bandage should be applied. It might even be advisable, where the injury is severe, to place a strong splint along each side or at the back of the joint, securing it at some distance above and below with stout straps, by which the animal might be restrained from bending the limb, and so disturbing the wound. If there be no open wound, but merely abrasion, the adhesive plaster may be dispensed with. An attentive watch should be kept for the purpose of detecting the first appearance of the heat, tenderness, and swelling, which

denote the presence of inflammation; when the usual counter applications must be employed, as recommended under the previous heads. Should no inflammation occur the cure may be completed under dressings similar to those first applied. In this kind of wound, as in every other, stimulating applications are to be avoided, unless specially indicated by the presence of deficient action. Where the injury has proceeded to such a depth as to pass beyond the part where the roots of the hair are attached, the scar left will ever afterwards remain naked, whatever means we may adopt to induce a reappearance of the natural covering. The gunpowder applied by the groom serves no other purpose than to hide the defect by blackening the surface, and even if we were able to have recourse to the ancient remedy of the ashes of a tortoise burnt alive, as recommended by Vegetius, we should find that we could gain little by substituting an animal for a vegetable charcoal. Should the roots of the hairs have escaped injury, the natural covering will be reproduced, when its growth may be assisted by the use of gentle frictions with some warm unctuous substance, such as the camphor ointment.

Gunshot wounds may with propriety be ranked in the class of contused wounds; but as animals employed in the affairs of peace are rarely subjected to this kind of injury, and as a correct knowledge of the appropriate treatment can only be acquired by those who seek to obtain it through experience in the midst of campaigns, it will be proper to abstain from encroaching here upon what must be held to be the peculiar province of the army veterinary surgeon.

III. Lacerated Wounds.—This description of injury may be caused by a nail, or other pointed but blunt-edged substance, penetrating the flesh of an animal while in motion, and tearing itself a passage outwards while the motion continues; or it may be occasioned by the bite of another animal, &c. The edges of a lacerated wound are unequal, and a flap torn and raised from the adjoining parts is a frequent accompaniment. The rules for treating this kind of injury do not differ from those applicable to contused wounds, and need not, therefore, be longer dwelt upon. I may remark, however, that our chance of obining an union by the first intention is greater in the lacerated n in the contused wound.

With this may be concluded the consideration of the treatment of simple wounds. I am aware that many readers may look in these remarks for some notice of numerous circumstances, of common occurrence in the management of this class of accidents, which they will find to be wholly omitted. But my aim has been to display only what might be considered as established principles of cure, and to illustrate these by general sketches of the appropriate treatment,—not to shew what ought to be their special application in every possible variety of case. Besides, many of the causes of variation in the nature and treatment of wounds depend upon the existence of circumstances, which bring the injuries in question under the head of *complicated wounds*, upon which neither my time nor space now permit me to enter, even had their consideration formed any part of my plan. Thus, I am compelled to omit all details concerning such wounds as may be complicated by profuse effusion of blood; by their having penetrated into some of the cavities of the body, or injured some of the internal organs; by their giving rise to attacks of spasm; or by their being contaminated by the presence of poisonous matters, of mortification, &c.; a highly interesting, yet difficult, field of inquiry. Should it have been my fortune to have had any portion of success in the more easy task of noting the principles which regulate the treatment of simple wounds, my object in writing will have been fulfilled; and I should not even have ventured to attempt so much, had I not been stimulated to the effort by having so often witnessed the principles in question violated on all sides, by individuals who practised at random, assuming no better guides than their own wilfulness and ignorance.

It is probable that many will find cause of reproach in the preceding remarks on the score of the occasional minuteness of the details, and, more especially, the technical language in which they are invested. The use of technical terms, however, has been avoided throughout, wherever a better or more generally understood term could be found to supply their place; but to expect a dissertation on any branch of science, from which the appropriate language of that science is required to be excluded, were to ask the performance of a task with the resources necessary

for its completion needlessly fettered. Let him who thinks otherwise attempt to describe the process of shoeing a horse, or any other of the most ordinary operations of the art, and he will discover that numerous phrases, in themselves strictly technical, are necessary for his purpose; the employment of which has become to him a matter devoid of difficulty, only because he has been enabled to familiarize himself with their just application. Such a familiarity with, at least, the more ordinary terms of the healing art, ought to be acquired, and may easily be acquired, by every one who wishes to attain some degree of knowledge of the nature and treatment of the various accidents incident to those animals, which may either form part of his property or be placed under his charge. Should such a task appear to him beyond his talents or his patience, it will be better for him to desist from all interference in a matter where his ignorance can tend only to evil; for, in the veterinary art, as in all others, an unskilful or negligent application of means is likely to produce no other effect, than to increase our difficulties, and remove us farther from our object. "Laboriosior," says Columella, one of the fathers of veterinary science, "est negligentia quam diligentia."

But it is to be regretted, that many of the writers on Farriery, whose works are in common circulation, seem to have addressed themselves exclusively to the unthinking and the indolent, to the standard of whose minds they have attempted to reduce that of the science. They would doubtless have acted better for the honour and advancement of their art, if, instead of degrading the science to the level of such minds, they had endeavoured rather so to train them as to raise them up to the level of the science; which, as displayed in the writings of a few of the most approved authors in this and other countries, occupies no despicable place in the scale of useful knowledge *.

* Among these it would be improper to omit ranking Mr Dick, the able Veterinary Professor to the Highland Society, whose conspicuous exertions for the advancement of that science, to which he has devoted himself with so much talent and zeal, cannot fail to be attended by the happiest results.

ON THE CLEANSING OF HIGH ROADS. *By Mr ROBERT BALLINGAL, Treaton, near Kennoway, Fifeshire.*

IT is a matter worthy of inquiry, after the large sums that are levied from the landed interest and the public, for keeping the turnpike and statute-labour roads of the country in a proper state of repair, whether the present system is the best that could be adopted, or if some other means could not be devised to lessen the expenditure of maintaining them. The following suggestions are made with the view of pointing out that economy is practicable, and not for the purpose of finding fault with the general management, as it must be allowed by every unprejudiced person that the present state of the roads (with very few exceptions), reflects very great credit upon the road-trustees, their surveyors, and contractors. But it must be perfectly evident to any one who turns his attention to the subject, that a very important branch of the improved system of macadamizing the roads, namely, the cleansing process, is most inadequate to preserve the metal from unnecessary waste. The road is allowed to remain saturated with wet, after heavy rains, which doubly wears it by the action of carriage-wheels, compared with what it would be if kept in a dry state; independently of the additional draught imposed upon the horses employed in drawing every description of carriages, when the mud is allowed to remain in a waxy puddle, until it is either completely dried up, and carried off into clouds of dust, or again moistened into a pulp.

The present system of cleansing practised (except in the immediate vicinity of cities and large towns) upon the country roads is, that when the autumnal rains set in, the roads are scraped by labourers previous to the winter coat of metal being laid on, and which is done at nearly the following expense:—

Six men, each furnished with a scraper from 1 foot to 16 inches wide, will clean about three-fourths of a mile per day, 18 feet in breadth, which, at 1s. 6d. per man, independently of tools, is 9s.; shovelling and gathering the mud into heaps on the side of the road, 9s. both 18s. or at the rate of 24s. per mile for this department of labour.

Let a comparison be made of the above expense with what it would probably be if the simple implements, afterwards described, were used for the execution of the same work, viz.—

A common double-horse cast-iron roller, which would cost,	L. 10	0	0
A horse-scraper, 6 feet broad, Fig. 1, ...	3	10	0
A mud-box, Fig. 3, ...	2	10	0
	L. 16	0	0

Suppose that a set of these implements were necessary for every ten miles of road, the outlay would be L. 1, 12s. per mile, or L. 16 for 10 miles; but let us enter into the detail of this expenditure to prove that an advantage really exists.

Four turns of the roller to prepare, and the scraper following, would clean 24 feet, which is the general breadth of the metal-bed upon the great thoroughfares; and, allowing the horse to travel at the rate of two miles an hour, the performance of work would be one mile in two hours; and, taking eight hours as a day's work, by this means the cleansing of four miles will be executed at the following expense:—

1 Horse, 1 Man, } Scraping, ...	L. 0	4	0
Rolling with two horses and one man, . .	0	9	6
Gathering mud with the box, . . .	0	9	6
Divide by 4)	1	4	6
Expense of 1 mile,	L. 0	6	1½

By the old method, . .	L. 1	4	0
With the machines, . .	0	6	1½
Balance in favour of the machines, ———	L. 0	17	10½

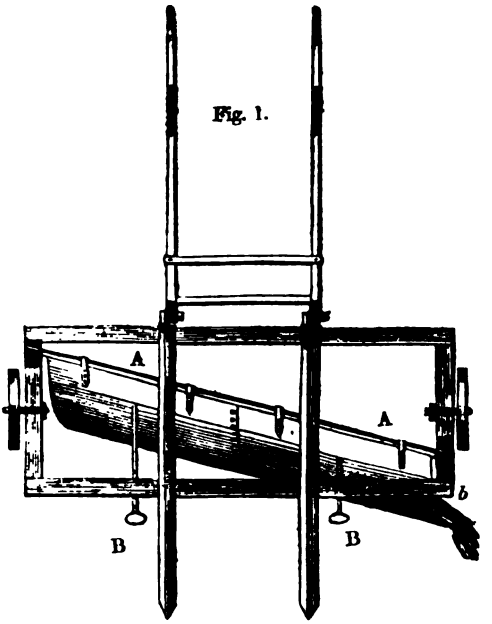
It therefore appears that 6 feet of additional breadth of road might be cleaned, and a saving of 17s. 10½d. per mile effected by adopting this instead of the present practice. But as it is difficult at all times to eradicate old and established habits, although they are allowed to be bad ones, the foregoing comparison pretty clearly elucidates that the essential circumstance of rolling the roads might be added, and also cleaned three times instead of once, for the same sum as at present, and yet leave a balance of 6s. per mile to cover the interest of the outlay and the repair of the machines.

I am perfectly aware that these suggestions are only calcu-d for well-formed and properly kept roads, such as are to be

found in the neighbourhood of Edinburgh, and many other districts that could be named. Therefore, upon the supposition that it is not only practicable, but to a certainty will prove beneficial to the districts alluded to, a certain consequence will follow on its adoption, either the expense of travelling will be lessened to the public, or a greater extent of more correctly formed roads will be afforded at the present assessments.

Fig. 1. represents a square frame of wood, 6 feet by 3 feet, supported upon two small wheels, with two shafts for a horse,

Fig. 1.

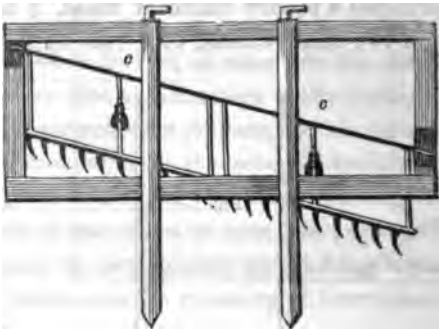


to be removed when necessary, and the frame attached to the roller by two short chains. AA are two iron scrapers, each 3 feet long and 1 foot in height, fixed by hinges to, and suspended from, an iron rod placed in a diagonal position across the frame. BB are two iron rods fixed to the back of the scrapers, and which lay hold of notches in the frame, in order to lift the scrapers off the surface of the road, when turning, or when passing any impediment, such as a piece of new-metalled road. The mud of the road is placed to one side by the scrapers, as at *b*.

Upon well-formed roads, the scrapers may be made 8 feet in length, clearing 32 feet of the breadth of the road at four turns. In that case, four scrapers of 2 feet long each, would be better than two at 4 feet each.

Fig. 2. represents two rakes attached to the scraper-rod, the scrapers being laid aside, for levelling the new metal upon a

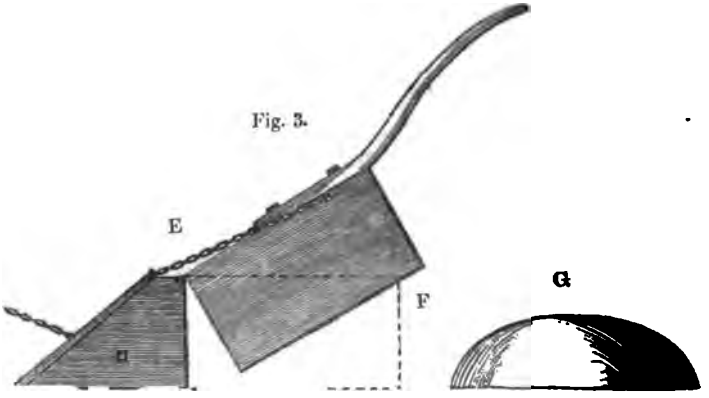
Fig. 2.



piece of road; *cc* are two iron rods, with notches, for suspending a heavier or lighter weight upon them, to give a less or greater pressure to the rakes. The distance between the teeth and their length, must be made to suit the size of the broken stones. D is the iron-rod to which the scrapers or rakes are attached. It has a pinching-screw at one end, to give a greater or less inclination to the scrapers or rakes, to suit the state of the road or the metal.

Fig. 3. represents the box for collecting the mud off the road

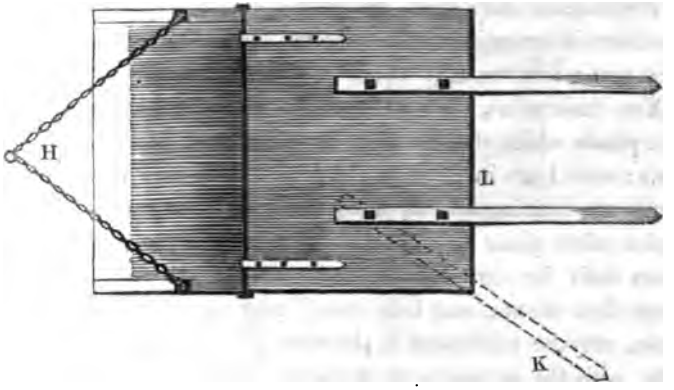
Fig. 3.



It is 4 feet by 3 feet, and is drawn by two horses with chains, and having two stilts for a man to direct it. The figure shows the box thrown up, to let the mud escape, and there is a small chain and hook E to keep it up. F are iron sides, open behind, to let the mud G escape, the bottom being also of sheet iron.

Fig. 4. represents the top of the mud-box, having the close part connected with hinges to the iron-rod I. K is one of the

I Fig. 4.



handles, made moveable, to allow the person who guides the machine to step aside when the mud is emptying. At L is a catch on the top of the box, to keep the moveable handle in a position parallel to the other. H are the draught-chains for the horses.

The mud ought to be collected by the box, whenever it is scraped off the road, and then the farmer would drive it away for composts. But the present practice of collecting the mud into heaps is too often delayed till the busy season with the farmer commences, and consequently it is allowed to remain on the sides of the road during the summer, to the annoyance of every traveller. These figures are made neither proportionally to one another, nor to any scale *.

* It may be right to mention, that the models of machines adapted to the cleansing of roads, but upon a different construction from those described by Mr Ballingal, were some time ago lodged by a gentleman in the Museum of the Highland Society of Scotland. He contrived them about five years ago, but declined making his suggestions public from a humane feeling, that their introduction on the roads would probably be the means of depriving many old men who are at present employed upon them of their means of subsistence. We have given Mr Ballingal's views to let the public judge for themselves.

EDITOR.

REMARKS ON THE EXCRETORY POWERS OF PLANTS.

(To the Editor of the Quarterly Journal of Agriculture.)

I HAVE read with considerable interest the articles on the rotation of crops and the excretory powers of plants in the two last numbers of the Journal, and do hope that some of your correspondents may soon, by further experiment, be enabled to give more information on the subject. In the mean time, I would offer you a few remarks which have occurred to my mind.

You inform us, that M. Macaire seems to have ascertained that plants which display their flowers exude matter from their roots; and I am inclined to think that it is only then, or when plants are forming and ripening their seeds, or dying, that exudation takes place to any extent, or such as to render the soil again unfit for carrying the same crop to advantage; for we know that onions, and I believe I may say every garden vegetable, may be cultivated in the same plot of ground year after year, with the assistance of manure, to advantage, except pease and beans, which are permitted to form the seed. Your correspondent, Mr Towers, also justly includes the rasp amongst the defilers of soil, which I would account for by its peculiar growth, namely, the wood *dying* every year, after having yielded the fruit.

This new discovery (if I may so call it) explains the remark of that wonderful man, Lord Kames, in the Gentleman Farmer, that plants exhaust or defile the soil chiefly when forming and ripening their seed: "Culmiferous plants," says his Lordship, "having small leaves, and few in number, depend mostly on the soil for nourishment, and little on the air. During the ripening of the seed, they draw probably their whole nourishment from the soil, as the leaves by this time, being dry and withered, must have lost their power of drawing nourishment from the air. Now, as culmiferous plants are chiefly cultivated for seed, and are not cut down till the seed be fully ripe, they may be pronounced all of them to be robbers, some more and some less. But such plants, while young, are all leaves, and in that state draw most of their nourishment from the air. Hence it is, that when cut

green for food to cattle, a culmiferous crop is far from being a robber." * But to show that they defile it only, and do not exhaust it,—I tried an experiment about five years ago:—Having often seen cresses growing in flannel moistened with water, I took that plant for my experiment, and sowed the seeds in a flower-pot filled with stocking, well washed to take the oil out of it; and the plants not only grew, but ripened their seeds, thus proving that plants do not require soil to bring them to maturity.

The practice of General Beatson sowing wheat on the same land year after year, (not that I recommend it,) cannot, I think, be explained on any other theory than that of destroying or decomposing the exudation of wheat by fire, that he was enabled to get such crops as he did. But I consider liming a better way of decomposing the exudation of plants; and as grass, oats, and barley are all of the same family, I have no doubt that this is one reason why it answers so well to lime land when laying it down to grass, and sowing barley, namely, the lime decomposes the exudation of the barley, and prevents it injuring the grass plants. Many old-fashioned farmers are still fond of spreading lime on grass land before breaking it up for oats; and I have no doubt, in the same way, the lime, by acting on the exudation of the grasses, prepares it as food for the oats, which it might otherwise injure.

I therefore hope you will continue to encourage those who are enabled to make experiments on grasses, and particularly as to the time when the exudation from their roots takes place, as we would then be taught the proper time for cutting hay; we would be taught if it was desirable to depasture our grasses so close as to prevent them seeding or flowering;—we would be taught whether or not we ought on all occasions to be at the expense of perennial grass seeds, if by the dying of the annual rye-grass the land is rendered afterwards unfit for oats;—perhaps we would be taught not to take oats at all in breaking up from grass, which is almost the universal practice at present, for we ought to remember that oats and grass are of the same family. I feel confident that in this particular, alteration may be made with advantage in the general rotation of the country; and I have no doubt another crop may be had without any extra manure,

* Gentleman Farmer, p. 137.

which would be no small advantage to the farmer. I am not prepared to say what crop should be taken in breaking up from grass. That must depend much upon the soil, and other circumstances; but I have known beans taken with advantage, and it must be either beans, vetches, peas or potatoes; then oats, turnips with dung, barley, grass, keeping the land in grass one, two, or three years, and giving lime with the barley every 12 or 14 years. S. W.

As the subject of the excrementitious rejections of the roots of plants, with reference to the rotation of crops, is of the utmost importance towards establishing a satisfactory theory of, or amendment on, the present mode of cropping, we subjoin a detailed account of the experiments of M. Macaire, corroborative of the original views on that subject of M. de Candolle, which has been published in the 5th volume of Mémoires de la Societé de Physique et d'Histoire Naturelle de Genève. This interesting paper was translated by Professor Rennie, and inserted in No. 9. of the Field Naturalist, from which we have his authority to copy it:—

"For a considerable time, M. De Candolle has been led to form a particular theory respecting the rotation of crops, founded on the hypothesis, that the roots were the seat of secretions of an especial nature. Some facts, already given in the *Flore Française* * by this learned naturalist, seem to have furnished him with the first opportunity of turning his thoughts to this important subject; he thus expresses himself, p. 67. "M. Brugmans, having placed some plants in dry sand, saw some small drops of water exude from the extremity of the radicles." And further on, in p. 91: "In fine, the roots themselves in some plants present particular secretions; this may be observed in the *Carduus arvensis*, the *Inula Helenium*, the *Scabiosa arvensis*, several *Euphorbias*, and several of the *Succories*. It appears that these secretions of the roots are only parts of the juices, which not having served for nourishment, are rejected when they arrive at the inferior parts of the vessels. Perhaps this phenomenon, which is not easily perceived, is common to a great number of plants. MM. Plenck and Humboldt conceiv-

* Published in 1805.—Editor Q. J. A.

ed the ingenious idea of seeking from this fact the cau
tain habits of plants. Thus, we know that the thist
rious to oats, the *Euphorbia* and *Scabiosa* to flax, the *I*
lina to the carrot, the *Erigeron acre* and tares to v
Perhaps the roots of these plants give out a matter
hurtful to the vegetation of others. On the contrary,
thrum salicaria grows freely near the willow, and the
Orobanche near the hemp, it is not because the secre
the roots of these plants are beneficial to the vegetat
others?"

"Extending these ideas still further, and applyin
the theory of the rotation of crops, both in his publ
and in his Vegetable Physiology *, M. De Candolle ad
every plant, in ejecting all the moisture that extends tc
cannot fail to eject also such particles as do not con
nourishment. Thus when the sap has been spread l
tion throughout the vegetable, elaborated and deprived
quantity of water by the leaves, and then redescendin
nished to the organs all the nourishment it contai
must be a residue of particles which cannot assimilat
vegetable, being improper for its nourishment. M.
dolle asserts that these particles, after having traversed
system without alteration, return to the earth by the
thus render it less proper to sustain a second crop o
family of vegetables, by accumulating soluble subst
cannot assimilate with it; in like manner, he observes, t
mal whatever can be sustained by its own excrement †
it may also follow that the action even of the organs
table converts the mixed particles into substances del
the plant which produces it, or to others, and that a
this poison is also rejected by the roots. Some e
which I had formerly the honour of communicating
ciety, have shewn that, in fact, vegetables may suffer
absorption of the poisons which they themselves furn
continual elongation of the roots renders the effect hu
the same generation of plants; it is the following of
species which suffers from it, while it is possible to im
on the contrary, these same excrements will furnish

* Published in 1827.—Editor Q. J. A.

† Yet the ostrich and cassowary always devour what falls from

and abundant nourishment to another order of vegetables. Tl
examples drawn from vegetables here offer themselves again wi
the force of analogy which is very remarkable. It was sti
perhaps, necessary to this very ingenious theory, which accounu
so reasonably for most of the facts obtained, to be more clear
confirmed by the results of direct experiments; and by the i
vitation of M. De Candolle I endeavoured to obtain them. Tl
thing was, however, not very easy, and my first attempts we
unavailing. I first strove to obtain the supposed exudation d
rectly from plants plucked up by the roots; but, with the e
ception of some very doubtful cases, it was impossible ever t
obtain any sufficient quantity, and the rapidity with which tl
plants perished in this state destroyed all chance of succeedir
by this means. I afterwards attempted to sow the seeds in sul
stances purely mineral, such as pure siliceous sand, pounde
glass, &c. Also on clean sponges, white linen, &c.; but althoug
they germinated well, the existence of the plants was always sho
and precarious, and when I endeavoured to collect their exud
tion by the use of earths, I found that the decomposition of tl
refuse from the seeds gave the same character to the whole
them, and that a sort of vegeto-animal substance was always o
tained, of which it was impossible to mistake the source, a
which entirely concealed the results of the real exudation, if a
were present in plants so imperfectly developed. As a la
resource, with the use of rain water, the purity of which I h
ascertained by the usual reactives, and which left no residu
after evaporation, I endeavoured to preserve plants that we
entirely developed. Their roots being taken from the grou
with the greatest care, I washed them minutely in rain w
er to remove all the mould, and when they were entire
cleansed from all impurity, they were dried and placed
phials with a certain quantity of water. I soon observed th
they flourished in it, developing their leaves, blossoming, an
after some time giving by the evaporation of water in whi
the roots were plunged, and by the reactives, evident mar
of exudation by the latter. Much time is required f
studying a great number of families, and at present I a
do to present to the Society only a kind of preface to a mo
extensive work. I have, however, seen the phenomenon repe
with a sufficient number of vegetables, and agree with the a

thor whose theory of the rotation of crops is the basis of my observations, in considering it nearly general, at least among all the phanerogamous vegetables.

" Vigorous plants of *Chondrilla muralis*, when placed in rain water filtered, having their roots first cleansed as I above described, vegetate and bloom freely. These were thrown away when in full bloom, and replaced by fresh ones every two days, to allow no time for a change of regimen. After eight days, the water acquired a yellow tint and a strong odour very similar to that of opium, and a bitter and rather a pungent taste; it precipitated in small brown flakes the solution of subacetate and neutral acetate of lead, rendered turbid a solution of gelatine, &c., and by slow evaporation deposited a residuum of a brown-reddish colour, which I shall examine hereafter, and which leaves no doubt that the water was perfectly free from any observable substance whatever. In order to ascertain whether this substance was produced or not from the vegetation of roots, I steeped, during the same time, the roots only of the *Chondrilla*, and in another phial, the stalks only, cut from the same plant. They continued fresh and in flower, but the water was not charged with any remarkable colour, had no taste, nor smell resembling opium, did not precipitate the acetate of lead, and contained scarcely any thing in solution. It was now clear to me that the produce obtained from the entire plant was the result of exudation from the roots, which took place only while the vegetable followed its natural course. The same experiments repeated on several other plants produced similar results, as will be seen when I speak of the produce of a small number of families which I have had time to examine. When once assured that plants rejected by their roots the parts improper for their nourishment, it remained for me to ascertain at what time of the day the phenomenon took place. For that purpose I steeped a vigorous plant of the kidney bean (*Phascolus vulgaris*) with the root in rain water during the day; at night the plant was taken out, washed carefully, dried, and replaced in another jug full of rain water: the experiment continued eight days, the plant continuing to vegetate with great vigour. On examining the two liquids, I found in both evident marks of the excretion from the roots; but the water in which the plant had vegetated during the night contained a considerably greater quantity. Both were

clear and transparent; the experiment being repeated many times on plants of different natures, produced always similar results. I am convinced that by causing artificial night for the plants during the day, the excretion of the roots would be instantly much increased; but in all the plants that I have tried, I always found that it continued slightly during the day. As it is well known that by day the action of the light causes the roots of the plants to absorb the liquid which contains their nourishment, it is natural to suppose that the absorption would cease during the night when the excretion takes place.

"It appeared probable that by means of the roots the plants might throw off the substances which they had imbibed, which were injurious to vegetation. To satisfy myself on this point, and at the same time, as the result was another means of verifying the existence of the excretion of roots, I tried the following experiments: some plants of annual mercury (*Mercurialis annua*), carefully taken up, and washed with great precaution in distilled water, were so placed that a portion of their roots was plunged in a slight solution of acetate of lead, and the other portion in pure water. They continued to live very well during several days; after which the pure water evidently precipitated the black hydrosulphate of ammonia, and consequently had received a certain quantity of salt of lead, rejected by the roots which were soaked in it. Groundsel (*Senecio vulgaris*), cabbages, and other plants, placed in the same manner, produced the same results. Some plants, which were placed in a slight solution of acetate of lead, lived very well during two days, after which they were taken out. Their roots were washed in a large quantity of distilled water, carefully dried, again washed in distilled water, which precipitated no hydrosulphate, after which they were left to vegetate in rain water: in two days the reactives demonstrated in the water a small quantity of acetate of lead.

"The experiments were made in lime water, which being less hurtful to vegetation than acetate of lead, was preferable for the object sought after. When part of the roots were steeped in lime water, and part in pure water, the plants lived very well, and the water considerably whitened the oxalate of ammonia which demonstrated the presence of lime. Also a plant that had [illegible] in lime water, and washed until the water no longer

precipitated the oxalate of ammonia, then transferred *into* pure water, after some time discharged a great quantity of lime, which was demonstrated by the reactives.

" I repeated the same trials with a slight solution of sea salt, and the nitrate of silver also demonstrated that the salt, which the plant had imbibed by absorption, was partly ejected by the same roots which had imprudently admitted it.

" When speaking to M. De Candolle of these results, he related to me a curious fact which he had himself observed. The plants that are cultivated near the sea for the produce of soda, sometimes thrive very well at a great distance from the ocean, provided they are placed within the influence of the sea air, which, it is well known, transports the particles of salt with which it is charged to a great distance. M. De Candolle was persuaded that the land where the kali thus placed had grown, contained more salt than the land adjoining; so that, instead of extracting it from the earth, these plants appeared to have furnished it by the exudation of their roots. Reflecting on this experiment, I imagined that I could perform it myself on a small scale with common plants, and I placed the roots with the plants of the groundsel, swine thistle (*Sonchus oleraceus,*) mercury, &c. in rain water, and proceeded to bathe the leaves with a solution of sea salt. My solution being too concentrated acted forcibly on the leaves, I diluted it with water, and with a pencil touched the lower part of the leaves and stalks; I even moistened all the green part of the plant, but the reactives never indicated any trace of salt rejected by the root, although the plants had flourished. Hence it appears, that either solutions of salt cannot imitate the proceedings of nature, or that perhaps the soda vegetables alone have the power of absorbing the marine salt, and of rejecting a portion of it by their roots. I should like very much to be able to repeat my experiment on a *Mesembryanthemum* or a *Salsola.* There is, then, no doubt that the plants have the power of rejecting by their roots those soluble salts injurious to vegetation, which are found in the water which they absorb; though but a small portion of these salts appeared in the residuum which I obtained in my own experiments, because the plants, imbibing only pure water and carbonic acid, could reject by their roots only the small quantity of salt which they contained at the time they were taken out of the earth. I

could gather little more than the result of the action of their organs on the aliment, not of foreign bodies, which only spread through the vegetable system without being decomposed. I shall now enter into some details on the small number of families which I have examined; each of them has produced results nearly similar in the divers individuals or kinds under experiment, but unhappily the number is very small.

"*Leguminosæ.*—The only plants examined of this family were kidney beans, peas, and beans of the species generally cultivated in this country. These plants exist and develope themselves extremely well in rain water. After they have vegetated in it some time, the liquid, when examined, has but little taste, and the smell is slightly herbaceous; it is clear, and scarcely coloured by the kidney bean, but turns more yellow with the pea and common bean; it precipitates the acetate of lead, and nitric acid re-dissolves the precipitated gum without effervescence; nitrate of silver gives a slight precipitate soluble in acid, (carbonic acid); oxalate of ammonia renders it turbid; the other reactives cause no change. By slow evaporation a yellowish or brownish residuum is obtained, more or less abundant, according to the plant under experiment, increasing in this order: kidney beans, peas, beans. In all other respects these residua are similar to each other. Ether separates an oily substance; alcohol nothing, and a substance remains analogous to gum and a little carbonate of lime.

"In the course of the experiments on these plants, I perceived that when the water in which they had been kept was charged with much excrementitious matter, the fresh flowers of the same species that were put into it faded quickly, and did not live well in it. To ascertain if this resulted from the want of carbonic acid, although they might draw it from the air, or from the effect of the matter excreted, which these plants refused to absorb, I replaced the leguminous plants by those of another family, especially that of corn. The latter lived in it, and the yellow colour of the liquid diminished in intensity; the residuum was less considerable, and it was evident that the new plants absorbed a part of the matter excreted by the former. It was a kind of rotation of crops in a bottle, and the result tends to confirm the theory of M. De Candolle, of which I spoke at the commencement of this memoir. It is not impossible that, by

trying this experiment on a great number of plants, we may arrive at some results which may be applicable to the practice of agriculture: for example, by supposing, as I feel disposed to believe by my trial, that the exudation from the roots of cultivated legumes contributes to the nourishment of corn, I should be disposed to conjecture, according to the relative quantity of these exudations, that the bean will produce the finest wheat, then the pea, next to that the kidney-bean. I am not sufficiently a practical agriculturist myself to know if experience has confirmed this view of the fact.

"*Gramineæ.*—The plants examined were wheat, rye, and barley.

"These plants do not thrive so well in rain-water as the *Leguminosæ*, and I suppose that this difference arises from the great quantity of mineral substances, especially silex, which they contain, and which they do not imbibe from pure water. The water in which they have vegetated is very clear, transparent, without colour, smell, or taste. The reactives demonstrate the presence of salts, muriates, and carbonates, alkaline and earthy; and the residuum from evaporation is scanty and but slightly coloured, containing but a very small proportion of the gummy matter, no oily matter, and the aforesaid salts. I should be led to believe that the exudation from the roots of these plants scarcely tends farther than to reject the saline matter which is foreign to vegetation.

"*Chicoraceæ.*—The plants examined were the *Chrondrilla muralis* and the *Sonchus oleraceus*. They live very well in rain-water; the latter acquires a clear yellow colour, a strong odour, and tastes bitter and somewhat virous. It precipitates abundantly brown flakes of neutral acetate of lead, and renders turbid a solution of gelatine. Evaporated slowly, the liquor, when concentrated, has a very strong and persistent taste. The residuum of a reddish brown, by boiling absolute alcohol, partly dissolves; the alcohol evaporating leaves a yellow, slightly brown, substance, of a very bitter taste, soluble in water, alcohol, and nitric acid, precipitated in brown flakes from its solutions by nitrate of silver, and appears to be very analogous to the bitter principle of the English chemists. The residuum, re-dissolved in water, has a very strong virous taste, similar to that of opium; it contains tannin, a brown gummy extractive substance, and

" *Papaveraceæ.*—Plants of the corn poppy (*Papaver Rhœas*) cannot live in rain-water; they fade in it immediately.

" The white poppy (*Papaver somniferum*) will exist in it; the roots impart to the water a yellow colour; it acquires a virous odour, a bitter taste, and the brownish residuum might be taken for opium. This plant is one of those of which I cut the roots from the stalks, and soaked them separately, and which imparted to the water none of the properties which it acquired from the entire living plant.

" *Euphorbiaceæ.*—The plants tried were the *Euphorbia Cyparisias* and *E. Peplus.* These are the euphorbias on which Brugmans says he had observed the phenomenon of small drops oozing from the roots during the night. Possibly I did not adopt the right method, as I could not verify the fact by my own observations. The euphorbias vegetate extremely well in rain-water; the liquor becomes slightly coloured, but acquires a strong and persistent taste, especially after it is concentrated by evaporation. Boiling alcohol dissolves almost all the residuum, which has but little colour, and by evaporation deposites a granulous substance, gummy, resinous, yellowish, white, very acrid, and unpleasant to the throat.

" *Solaneæ.*—The only plant of this family that I had time to vegetate is the potato. It lived well in rain-water, and developed its leaves. The water, not coloured, leaves very little residuum, and the taste is very slight; which makes me think that the plant is one of those of which the excretions are very trifling, and scarcely perceptible. But this conclusion is drawn from a single and very short experiment made on a plant scarcely developed.

" In concluding this memoir, which should have contained the examination of more families and individuals had the time permitted, I shall recount that the results deduced are: First, That most vegetables exude by their roots substances useless to vegetation; second, That the nature of these substances varies according to the families of the vegetables that produce them; third, That some being pungent and resinous may hurt, and others being sweet and gummy may contribute to, the nourishment of other vegetables; fourth, That these facts tend to confirm the theory of the rotation of crops suggested by M. De Candolle."

MISCELLANEOUS NOTICES.

I. *Sinking Fund.*

1*st*, Table showing the amount of the Sinking Fund, and the amount of debt redeemed annually for the last twenty years.—

1813	L. 24,246,000			
1814	27,522,000	{Sinking Fund broken upon.}	1823	L. 17,966,000
1815	22,559,000		1824	4,828,000
1816	24,001,000		1825	10,583,000
1817	23,117,000		1826	3,313,000
1818	19,460,000		1827	2,886,000
1819	19,648,000		1828	2,732,000
1820	31,191,000		1829	2,834,000
1821	24,518,000		1830	2,900,000
1822	23,605,000		1831	System abandoned.

2*d*, Table showing the growth of the Sinking Fund from its institution by Mr Pitt in 1786, till it was broken upon in 1813, with the amount of stock redeemed in each year:—

1786	L. 662,000	Carried forward	L. 48,178,000
1787	1,503,000	1800	10,713,000
1788	1,506,000	1801	10,491,000
1789	1,558,000	1802	9,436,000
1790	1,587,000	1803	13,181,000
1791	1,507,000	1804	12,860,000
1792	1,962,000	1805	13,759,000
1793	2,174,000	1806	15,341,000
1794	2,804,000	1807	16,064,000
1795	3,083,000	1808	16,161,000
1796	4,390,000	1809	16,665,000
1797	6,790,000	1810	17,884,000
1798	8,102,000	1811	20,733,000
1799	10,550,000	1812	24,266,000
		1813	27,522,000
	L. 48,178,000		L. 273,234,000

N. B. These sums are the *stock* paid off, not the sterling money advanced, by the Sinking Fund, which was in general less in the proportion of the current price of stock to 100.

3*d*, Table shewing what the Sinking Fund would have paid off, if not encroached upon, from 1813 to 1833, in sterling money, beginning with a fund of L. 15,000,000.

1813	L. 15,000,000	Brought over,	L. 212,660,625
1814	15,750,000	1824	25,530,240
1815	16,537,000	1825	26,839,360
1816	17,363,870	1826	28,181,423
1817	18,231,973	1827	29,590,464
1818	19,143,566	1828	31,579,590
1819	20,100,774	1829	33,158,577
1820	21,005,038	1830	34,816,000
1821	22,055,284	1831	35,524,000
1822	23,157,048	1832	37,238,000
1823	24,315,572	1833	39,099,000
Carry over,	L. 212,660,625		L. 534,227,260

Pebrer's Statistical Tables.

II. *Dividends of Stock.*—By a Parliamentary return just published, we observe, that the number of parties who had claims to half-yearly dividends, payable on the 10th October 1832, and 5th January 1833, amounted to 279,751, inclusive of 252 public companies and trustees, or parties to joint accounts, entitled to dividends not exceeding L. 1000.

The number of persons to whom dividends were due not exceeding					L. 5	was	87,176
Above	L. 5, and not exceeding				10	...	44,648
...	10	...	...		50	...	98,305
...	50	...	...		100	...	26,641
...	100	...	...		200	...	14,701
...	200	...	...		300	...	4,495
...	300	...	...		500	...	2,827
...	500	...	...		1000	...	1,367
...	1000	...	...		2000	...	417
...	2000	...	...		3000	...	75
...	3000	...	...		4000	...	39
...	4000	...	...		5000	...	14
Exceeding	5000	...	...			...	46

The total number at each period, according to the respective Stocks, on each amount of which these persons receive dividends, was as under—

3 per cent. Reduced Annuities,	33,958
3½ ditto ditto,	26,849
3½ per cent. Annuities, 1818,	1,232
4 ditto ditto 1826,	5,636
Long Annuities,	24,221
Annuities for terms of years,	4,583
	96,479
Persons to whom dividends were due 10th October 1832,	
3 per cent. Consolidated Annuities,	95,555
3 ditto ditto 1726,	447
New 3½ per cent. Annuities,	82,194
New 5 ditto ditto,	237
Annuities for terms of years,	4,839
Persons to whom dividends were due 5th January 1833,	183,272

From the preceding analysis it would appear, that nearly one-half of the fundholders (viz. 131,824) belonged to the two lowest classes, those receiving sums which varied from the smallest fractions to dividends not exceeding L. 10. Above *seven-eighths* of them (viz. 255,770) consisted of persons to whom dividends were due, which, in no case, exceeded L. 100; and only one person in every 60 fundholders was in receipt of a dividend exceeding L. 300, the number of the latter being 4,785 only. The proportion of individuals entitled to dividends above L. 1000 was 1 in every 473. Taking the population of the kingdom at 23,000,000 souls, and putting the fair portion who may hold stock, and are non-residents, out of the question, the proportion of individuals receiving annuities from the state will average 1 in every 85 persons.—*Universal Corn Reporter.*

III. *Taxes Repealed since the Peace.*

		Nett Produce.	Gross Produce.
1814,	War duties on Goods, &c. - -	L. 932,000	L. 948,861
1815,	Ditto ditto, - - - - - -	222,000	222,749
1816,	War Malt-duties, Property Tax, &c.	17,547,000	17,886,666
1817,	Sweet Wines, - - - - -	37,000	37,812
1818,	Vinegars, &c. - - - - -	9,500	9,524
1819,	Plate Glass, &c. - - - - -	269,000	273,573
1820,	Beer in Scotland, - - - -	4,000	4,000
1821,	Wool, &c. - - - - - -	471,000	490,113
1822,	Annual Malt and Hides, - -	2,139,000	2,164,037
1823,	Salt and Assessed Taxes, - -	4,185,000	4,286,389
1824,	Thrown Silk and Salt, - -	1,801,000	1,805,467
1825,	Wine, Salt, &c. - - - -	3,676,000	3,771,019
1826,	Rum, British Spirits, - - -	1,967,000	1,473,915
1827,	Stamps, - - - - - -	84,000	84,038
1828,	Rice, &c. - - - - - -	51,000	52,227
1829,	Silk, &c. - - - - - -	126,000	126,406
1830,	Beer, Hides, and Sugars, - -	4,070,000	4,264,425
1831,	Printed Cottons, Coals, - -	1,588,000	3,189,312
1832,	Candles, Almonds, &c. - -	747,000	754,996
1833,	Soap, tiles, &c. estimated at -	1,000,000	1,100,000
		L. 40,915,000	L. 43,445,520
	Laid on in the same time,	5,813,000	
	Nett balance reduced,	L. 35,102,000	
	Of which was direct taxes, - - - -	L. 17,628,000	
	Indirect, - - -	17,490,000	
		35,118,000	

Parliamentary Paper, 14th June 1833.

IV. *Taxation and the Gold Standard.*—Comparative view of the pressure of Taxation and the Gold Standard upon Industry, and the prices of Stock in 1832 and 1818.

	1818.	1832.
Population of Great Britain, - - -	13,850,000	16,800,000
Average price of wheat, - - - -	83/8	53/
Average price of gold, - - - - -	81/6	77/10½
L. 100 official value in manufactures was worth in money, - - - - - -	L. 109	L. 55
Actual amount of taxes, - - - -	L. 53,075,000	L. 46,500,000
These amounts of taxes equivalent to quarters of wheat, - - - - - - -	Qrs. 12,687,000	Qrs. 17,526,000
... in ounces of gold, - - - - -	Oz. 13,025,000	Oz. 11,923,000
... in manufactures, - - - - -	L. 48,623,000	L. 84,545,00

If, in 1818, 13,850,000 people contributed in taxes L. 53,075,000, the proportion appertaining to 16,800,000 people in 1832, is not L. 46,500,000, what the taxes are, but it ought to be L. 66,380,000. Yet the greater number of people are less able to pay the less amount of taxes in 1832, than the less number were to pay the greater amount in 1818.—*Universal Corn Reporter.*

V. *Statistics of Spain.*—The population of Spain may be estimated at 14,150,000; its revenue is about L. 5,850,000, and its expenditure about L. 6,300,000. This last item embraces a sum of L. 560,000 for the royal household and family, of L. 1,960,000 for interest of floating and other debts, sinking fund, &c., and of L. 2,800,000 for the war department. The military forces comprise 230 officers on the staff, of whom 60 are lieutenant-generals, 19,889 garde du corps, halberdists, infantry, cavalry, and horse artillery attached to

the royal guards; 36,000 infantry of the line (consisting of 17 regiments of regulars, 6 of light infantry, and a garrison regiment), 4,529 artillery, 1,094 engineers, 6,348 cavalry, (composed of 5 regiments of heavy, and 7 regiments of light infantry), 1,452 Swiss, (being the skeletons of 3 regiments), 25,910 provincial militia, forming the reserve of the regular forces, 1,200 veterans, making 14 companies, and 550 invalids. Such, at least when in effective condition, is the amount of the Spanish army, as fixed by a royal decree in 1828. We have no later details of the navy than those of the same year, when it consisted of 124 vessels, namely 6 ships of the line, 12 frigates, and 69 smaller vessels. Reverting to the population we have a return before us for the year 1829 which shews the number of inhabitants, inclusive of those in its American, African and Asiatic possessions, to have been at that time 17,833,793; who are thus classed,

Europe—The Laity,	13,790,134	
Clergy,	122,345	
Armed Forces,	100,732	
Marine	14,065	
		14,027,276
Asia—Island of Manilla,	1,822,825	
The Bessays,	632,395	
Part of Magindamer,	45,500	
		2,500,720
Africa—The Presidias,	11,481	
The Canaries,	196,517	
Adnabon,	1,800	
		209,798
America—The Havannah (Cuba,)	800,000	
Puerto Rico,	288,000	
Calebra,	2,600	
		1,000,600
Australia.—The Marianes		5,339
Total population,		17,833,793

Spain itself contains 4350 towns, and 12,495 villages formed, with their respective districts, into 18,871 parishes. Of the towns 61 possess a population of upwards 10,000 each. Amongst them are Madrid (in 1829) 115,000; Barcelona 105,000; Seville 102,000; Cadiz 76,000; Grenada 66,661; Valencia 70,000; Malaga 52,376; Zarragoza 45,000; Isla de Leon 41,000; Cordova 50,000; Murcia 34,800; and Valadolid 30,200. In the same return, Bilbos is set down at 14,500; Pampeluna at 14,054; San Sebastian at 13,100; and Burgos at 11,000. In a financial and civil point of view, Spain is divided into 24 Intendancies; and in a military one into 12 great captaincy-generals,

* In 1830, the revenues of this island produced L. 1,528,520, of which L. 1,038,790 were derived from the customs and post-duties, and L. 489,730 from the land-tax. But the number of inhabitants appears to have been less than the Spanish return states; they are returned from the island under 700,000.

and 5 other commands of much more limited extent. Its greatest breadth is 580 miles from Lanza to the north of Rozes in Catalonia, to Ayamonte at the mouth of the Guadiana, in the intendancy of Seville; and its greatest length is 502 miles from Cape Prince near Ferrol in Galicia, to Cape Gate, in the intendancy of Grenada.—*From the Guardian and Public Ledger.*

VI. *Commerce of the United States.*—From the last report of the Secretary of the Treasury we make the following extracts:—

Exports to foreign countries, for the year ending Sept. 30. 1832.

		Dollars.
Products of the sea (fish, oil, &c.)		2,558,538
Do. of the forest (lumber, ashes, &c.)		4,347,794
Do. of agriculture;		
Products of animals,	3,179,522	
Vegetable food,	8,352,494	
Tobacco,	5,999,769	
Cotton,	31,724,682	
Flax-seed,	123,036	
Hops,	25,448	
Brown sugar,	11,232	
		49,416,183
Manufactures,		5,044,014
Gold and silver coin,		1,410,941
Total domestic exports,		63,137,470
Exports of foreign produce and manufactures,		24,039,473
Total exports,		87,176,943
Imports in American vessels,	90,298,229	
Ditto in foreign,	10,731,037	
	101,029,266	

Arrivals and departures for the year ending 30th September 1832.

	Tons.
American vessels entered into the United States,	949,622
Foreign ditto,	393,038
	1,342,660
American vessels departed from the United States,	974,865
Foreign,	387,505
	1,362,370

Of the above 298,127 tons of American vessels, and 102,388 of foreign vessels entered the port of New York.—*The Knickerbocker, or New York Monthly Magazine.*

VII.—*Comparative Cost of Building, Provisioning, and Sailing a Vessel of 400 tons, for one year, from a Prussian and an English Port.*

		Prussian.			English.					
	L. s	L.	s.	D.	L.	s.	D.	L.	s.	D.
Cost of building, &c.	6 10 per ton,	2,600	0	0	12 10	0		5000	0	0
Wages of Captain at	2 10 ... month,	30	0	0	10 0	0		120	0	0
Two Mates,	1 10	36	0	0	4 10	9		108	0	0
Seamen, twenty-three,	0 18	248	0	0	Twenty at L. 2, 5s.			540	0	0
Victuals, difference both of food and price,	7d. ... day,	278	0	0	0 1	2		400	0	0
Repairs at 10 per cent.		260	0	0				500	0	0
		L. 3452	0	0				L. 6668	0	0

To the credit of the English vessel comes a saving on the *premium* of insurance, amounting only to 1 per cent. on the cargo and freight.

VIII. *Revolutionary Victims in France.*—Account of the victims of the first French Revolution, from the statements of the Republican Prudhomme.

Nobles,		1,278
Noble women,		750
Wives of labourers and of artizans,		1,467
Religieuses,		350
Priests,		1,335
Common persons (not noble),		13,623
Guillotined by sentence of the Revolutionary Tribunal,		18,603
Women died of premature childbirth,		3,400
In childbirth from grief,		348
Women killed in La Vendee,		15,000
Children killed in La Vendee,		22,000
Men killed in La Vendee,		900,000
Victims under Carriere, at Nantes,		32,000
Of whom were Children shot,	500	
Children drowned,	1,500	
Women shot,	264	
Women drowned,	500	
Priests shot,	300	
Priests drowned,	460	
Nobles drowned,	1,400	
Artizans drowned,	5,300	
Victims at Lyons,		31,000
Total,		1,090,954

It is in an especial manner remarkable in this dismal catalogue, how large a proportion of the victims of the Revolution were persons in the middling and lower ranks of life. The priests and nobles guillotined are only 2,160, while the infants drowned and shot are 2000, the women 764, and the artizans 5300! So rapidly, in revolutionary convulsions, does the career of cruelty reach the lower orders, and so wide spread is the carnage dealt out to them compared with that which they have sought to inflict on their superiors.—*Alison's History of the French Revolution.*

IX. *Comparative Health in England.*—In every 10,000 of the persons buried, there died,

	Under 20 years old.	Under 40 years old.	Lived to 40 and upwards.
In a healthy county,	3756	5031	4969
In a marshy county,	4279	5805	4195
In the metropolis,	4580	6111	3889
In the city of Chester,	4538	6066	3934
In the city of Carlisle (former state),	4962	6049	3951
In the city of Carlisle (present state),	5668	6927	3071
In the town of Bradford (worsted spinning),	5896	7061	2939
In the town of Macclesfield { silk spinning and throwing,	5889	7300	2700
In the town of Wigan (cotton-spinning, &c.)	5911	7117	2883
In the town of Preston,	6083	7462	2538
In the town of Bury,	6017	7319	2681
In the town of Stockport,	6005	7367	2633
In the town of Bolton,	6113	7459	2541
In the town of Leeds { woollen, flax, and silk spinning, &c.,	6213	7441	2559
In Hoeck [illegible]-spinning,	6133	7337	2663

that about as many have died *before their twentieth year*, where manufac-
es exclusively prevail, *as before their fortieth year* elsewhere.—*From a Par-
ientary Paper.*

X. *Average Price of Foreign Wheat.*—An account furnished by the consuls
lifferent ports, shewing the average price of wheat at the different times
cified.

	Dant-zig.		Ham-burgh.		Leg-horn.		Phila-delphia.		Amster-dam.		Rotter-dam.		Ant-werp.		Havre.		Mar-seilles.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
28. July,	24	3	23	0	39	7	29	9	30	9	33	4	34	6	30	3	52	0
October,	56	6	41	8	44	9	37	2	41	1	54	0	47	10	56	10	60	2
29. January,	59	2	49	7	61	0	53	0	55	0	...		58	10	58	0	63	9
April,	43	2	46	11	52	4	51	0	45	8	50	5	55	8	61	10	59	6
July,	36	9	36	11	47	10	42	6	45	11	48	11	52	1	60	6	56	11
October,	38	1	34	6	38	7	35	0	43	2	41	9	51	4	51	3	58	6
30. January,	29	9	31	3	35	11	36	0	...		...		41	1	44	0	57	10
April,	33	9	31	0	39	7	...		36	0	36	8	40	0	45	8	61	5
July,	43	3	35	2	36	4	34	9	41	10	43	2	43	10	47	1	58	7
October,	39	10	38	7	41	5	33	10	46	9	48	0	51	5	53	0	59	10
31. January,	47	5	46	9	47	4	38	11	41	1	...		54	5	47	5	52	11
April,	48	7	49	0	43	1	47	3	47	3	57	9	52	9	49	0	53	3
July,	45	7	37	6	48	2	34	0	41	10	51	4	55	2	50	3	51	7
October,	41	1	45	0	45	3	35	8	43	2	50	6	57	0	54	6	58	7
32. January,	42	4	37	10	41	0	35	3	43	5	...		48	0	49	0	60	6
April,	38	3	37	10	43	8	33	4	38	3	41	4	47	11	52	1	64	3
July,	42	6	39	3	41	2	40	10	44	8	41	6	50	6	52	1	...	
October,	30	7	28	4	39	5	36	7	39	9	37	3	43	4	51	6	56	10
December,	29	0	29	3	41	0	38	9	38	11	40	4	46	6	48	6	57	6

XI. *Wool and Woollens.*—The total number of pounds of sheep and lambs'
ol imported into the United Kingdom in 1832 was—foreign, 28,128,973;
duce of the Isle of Man, 13,516. Quantity retained for home consump-
n, charged 1d. per lb. duty, 23,619,901; ditto, ½d. 1,571,328; ditto 6d.
d wool) 1130; duty free (produce of British possessions,) 2,473,991.
tal retained for home consumption, 27,666,350. Total quantity re-export-
555,014. Quantity of foreign wool warehoused under bond 5th January,
33, 3,165,651. The total quantity of British wool and woollen yarn ex-
ted from the United Kingdom in 1832 was, of the former, 4,199,825 lb., of
latter, 2,204,464 lb. The exportation of British woollen manufactures
1832 was as follows:—Cloths of all sorts, 396,661 pieces; napped count-
s, doffels, &c., 23,453 pieces; kerseymeres, 40,984 pieces; baizes, 34,874
ces; stuffs, woollen or worsted, 1,800,714 pieces; flannel, 2,304,750
ds: blankets and blanketing, 1,681,840 yards; carpets and carpeting,
),042 yards; woollens mixed with cotton, 1,334,072 yards; stockings,
ollen or worsted, 152,810 dozen pairs. Sundries, viz. hosiery, rugs, cover-
s, tapes and small wares, L. 55,443 : 1: 8 value.—Declared value of Bri-
woollen manufactures exported, L. 5,244,478 : 10 : 10.

QUARTERLY AGRICULTURAL REPORT.

FEBRUARY 1834.

THE weather is, in this country, at all times an excellent introductory topic for conversation. If it ever deserved to be talked of, the winter quarter which has passed claims our colloquial regard in a pre-eminent degree, for a more mild winter was never seen, even by that very venerable personage, "the oldest inhabitant of the parish," to whom one of our correspondents, in the present number, has so happily alluded. There have only been four days of frost sufficiently keen to preserve the thin pellicle of ice on the small pools from the "melting mood" before the meridian sun. As to the glacial sports of skating, curling, sliding, and snow-balling, "Oh, no, we never mention them; their name is never heard." The salmon should have a jubilee this summer, though it should grieve the cockney gourmands. Prognosticators foretold a dreadful winter, because they saw great and early flights of arctic birds in autumn towards the south. These creatures were, doubtless, prompted by a wise instinct. Perhaps the arctic regions are now reposing in deep sleep, on a bed of "thick ribbed ice."—So much the better for ourselves, for the deeper their sleep, they are less likely to disturb their neighbours; and it is also better for the buoyant, light-hearted "cleavers of the air" that they took an early departure; for had they remained, their active limbs and swift pinions would probably have been benumbed by the "icy hand of death."

We shall not know whether the prognostications of the birds have proved true, till our whalers again penetrate to Boothea; but we can assure our friends that Mr Mackenzie, commonly called "the man of the weather,"—as if he derived his notions of the weather from some instinctive feeling, which he cannot explain—has prognosticated truly, so far as the season from last November is concerned; and we understand he gives serious warnings to the farmers, that if they do not get the seed into the ground before the end of February, they will not be able to accomplish it for a long time to come, because of continued rains; that the corn will be as green in July as it usually is in June, and that this year, and others to follow, will experience late harvests. Should he succeed in all these wonderful but woful predictions, he may assume to himself the envied character of old, a "fore-teller of future events," and [illegible] on some hill-top, towards which farmers and shepherds,

fishermen and sailors, too, may do homage to the modern Janus. Another peculiarity of the last winter has been the prevalence of very high *westerly* winds, which is probably the consecutive effect of continued fresh weather. The consequence has been, that the mercury in the barometer has shown its agility in a remarkable manner. The havoc among the shipping on our coasts has been lamentable. In connection with barometrical observations and shipwrecks, we may mention the very interesting fact, of which we have the fullest assurance, that a captain of a ship belonging to this country was enabled to save his ship from wreck, and himself and crew from watery graves, by taking timeous warning from the indications of Adie's *Sympiesometer*. Great torrents of rain have fallen this winter in parts of France and Germany, and the United Kingdom, to the dreaded injury of the new sown wheat.

With regard to agricultural business, much may be said in a few words. The young wheat is looking very luxuriant, except on thin clays. An unusual breadth of spring wheat has likely been sown during the fresh weather. Young grass promises an early bite, and the old has been daily visited, in many parts of the country, by the young cattle during the whole winter. Turnips have begun to assume a growth on light lands, but on the heavier soils there is yet little vegetation. Their consumption has been more than usually rapid; though the very wet and windy weather has been so troublesome to sheep both on turnips and grass, that serious apprehensions of injurious effects to their constitution are generally entertained. Indeed, hogs have already died in numbers. Live stock still continue to maintain high prices, for prices are certainly high when beef and mutton sell for sixpence and upwards a pound; but markets are plentifully supplied. We suspect there will be few fat beasts to dispose of in the spring, for a new species of trade is in operation, which has, and if continued will, have a great influence on the prices of live stock in this country. We allude to the prevailing practice of sending live stock and butcher-meat by steam-vessels to London. The ensuing summer will probably witness a very active trade in this line from Edinburgh, Berwick-upon-Tweed, Dundee, Aberdeen, Glasgow, and the Solway Frith. At present, freights for live-stock and meat are too high, but competition will lower them. The prices of wool continue to advance. Hogg wool readily fetches from 36s. to 42s. per stone of 24 pounds. Even sheep skins are realizing 10s. 6d. a-piece, and it is the general opinion

that they will be 12s. before clipping time. Complaints among the farmers every where prevail of the very depressed prices of corn. The average of the last week for wheat, throughout the kingdom, was only 48s. 7d., and the aggregate average of the six weeks ending 24th January was 49s. 2d. per quarter. Had it not been for the prices of wool and live-stock, the farmers of this country could not have stood their ground. As it is, every year impresses more strongly than its predecessor, the necessity of adopting the mixed system of husbandry on every species of soil which suits it;—that system, which, commixing the rearing of live stock with the raising of corn, can alone support agriculturists amidst the impending ruin which awaits the *corn* farmer. From the continual agitation of the corn question, it is obvious the present corn laws will not get leave to stand. The fluctuating principle will unhappily be abandoned for a fixed duty, in order to pave the way for a total repeal. The agricultural interest must make up their minds for the great change, and we would only be prolonging the delusion were we to hold up other prospects to them. Our apprehensions are founded on the political constitution of the House of Commons. In it the influence of the agricultural interest has no sway; and the prostration of the power and influence of the Upper House is a standing subject of grief to the well disposed, and a source of derision to the disaffected.

The question of the Corn Laws is pressed more and more upon our attention. Magazines, pamphlets, public meetings,—all the materiel of noisy warfare,—are put in requisition to remove protection from agriculture, and to establish what is termed a free trade in corn, that the prediction of the economists might be fulfilled, that, but for corn laws the manufactures would raise this country to the highest pitch of prosperity. Were these doctrines promulgated by men who, upon all occasions, have shown respect for institutions, and an anxious desire for the removal of *real* abuses, the discussion of the propriety of totally repealing the corn laws might be dispassionately discussed with them; but when they are the same men who have long advocated the most latitudinarian principles on every subject, a suspicion of their motives in interfering with the corn laws may reasonably be entertained by the agricultural interest. Their interference, when they have now few other things to do, must leave no doubt of their ultimate object being to abase the aristocracy by crippling the landed interest.

" Loud, deep, and lang, the thunders bellowed;
That night a child might understand
The Deil had business on his hand."

But there are men who have no desire to distress the agriculturists, who confess that agriculture is the main stay of the nation, but who nevertheless would desire a modification of the present laws. They maintain that they uphold the prices of corn above their natural level,—that the value of corn being thus enhanced injuriously increases the expense of manufacture; and that, were our manufactures cheaper, foreign nations would be induced to exchange their corn for them, for they have nothing else. Among the objectors to the present corn laws, is a writer in the last number of the Edinburgh Review (the 118th), who conceives that a moderate fixed duty on the importation of foreign corn would remove all these evils, and benefit the nation in general more than it would injure agriculture.

The Reviewer lays considerable stress on the restrictive principle of the present law, and the gambling disposition which it encourages in speculators in corn. These objections, we conceive, apply more strongly to the law of 1815 than the present one. Corn is not prohibited from being imported at all times, as it was under the law of 1815; and whatever disposition to gambling may be encouraged at present, it cannot be of so desperate a character as when speculators were excluded from the market for at least three months at a time. Upon one occasion they were excluded three years by the law of 1815. At the same time, we confess that the fluctuation of 2s. per quarter for every shilling of price, and the high pitch at which the scale of duty is fixed, do encourage a spirit for gambling. We, however, maintain that the principle of a fluctuating duty has no evil involved in it, and that it could be made to operate in a beneficial manner to every interest in the country. We never were sticklers for the present laws, but they would be injurious to no one were they modified in the following manner. Let the prices of corn be returned from every market town in the kingdom, and let the returns only contain the sales *of the farmers*, whether effected in the public market or to millers and bakers in the country. Such returns would give the true price of corn received by the growers, and would not be mixed up with the profits of corn merchants; and they would be useful in valuing corn-rents and tithes when commuted. With dealers there *may* be collusion to affect the average prices, but with farmers there *can* be none. At pre-

sent, the average prices always appear greater than those obtained by the growers of corn. The scale of duty could be lowered to suit the foreign prices, and the range of prices to which the scale is applied, might be more limited than it is. We shall take two facts from the Reviewer's own data to illustrate our meaning. He proposes 7s. per quarter as a fixed duty on wheat; and he says that the best foreign wheat from Dantzig would cost 55s. per quarter to bring to our markets. To obtain an average of 7s., a range of duty from 14s. to 1s. would be required, according to the fluctuating scale. Thus, foreign wheat would be imported duty free, when our market attained 55s., and it would pay 14s. when at 41s. per quarter. Now, what reasonable objections could the Reviewer have to a low price of corn on this principle? This example is not given, because we think that 7s. duty, and the scale ranging 14s., form an adequate protection to agriculture, but because it shews that a low price of corn, which is all we presume the Reviewer desires, may exist with a fluctuating duty as well as with a fixed one.

But the Reviewer maintains, that the only claim to a duty at all, arises from the agriculturists being burdened with taxes which affect no other interest; and as long as these peculiar burdens remain unchanged, the duty, whatever may be its amount, ought to be fixed, and that it can have nothing to do with the prices of corn in Great Britain or on the Continent. "It ought to be imposed," says he, "not to benefit the agriculturists, but to do them justice —to balance the excess of taxes with which they are charged; and as this excess is not affected by variations of price, so neither ought the countervailing duty." The Reviewer here evidently does not distinguish between two questions quite different in principle and effect. It may be well to *fix* the duty, which is equivalent to the peculiar burdens paid by the landed interest, and which is designed by the Reviewer to place them on a footing of equality, in regard to taxes, with the manufacturing interest. But the most important part of the question still remains, and which the Reviewer would [illegible] rightly, but which, in our opinion, gives great importance to the corn laws, namely, the nature of the competition which the agriculturists of this country have to maintain in our own markets against the Continental corn growers. The 7s. duty may place the agriculturists here on a footing, in regard to taxes, with their manufacturing countrymen; but it will not place them on a footing with their untaxed foreign agricultural competitors. The Reviewer, however, will not sanction any duty against such an unfair competition,

though he does not utter one word against the protective duties on foreign manufactures, which amount to from 15 to 30 per cent., and which ought to be abrogated before the two interests are placed on a footing in regard to foreign competition; and yet he gravely affirms that he "heartily dislikes all advocacy of particular interests."

The woollen manufacture is particularly protected, for foreign wool is imported to the amount of 32 millions of pounds annually, duty free, while woollen manufactures are protected from foreign competition with an *ad valorem* duty of 30 per cent. The case of wool has frequently been brought forward by the friends of the agriculturists, as one of extreme injustice to them. We cannot, however, join in this complaint. Almost all the wool imported from abroad is of fine quality, and of a quality which cannot be successfully raised in this country, owing to the harshness of the climate. It should therefore be admitted freely. Our own growth of wool, on the other hand, is of a kind which cannot be obtained in perfection from abroad. It has therefore possession of the home market. The present price of wool justifies our opinion, that the wool-growers of this country, when they do suffer, do not suffer from foreign competition.

The greatest objection to a fixed duty is the impossibility of its exaction in years of scarcity. The Reviewer sees this difficulty, but thinks it will not occur once in a quarter of a century. It is some consolation to the nation to be assured that it will not experience a scarcity in corn more than four times in a century. The Reviewer, half conscious that this statement is not likely to be credited by those who have frequently reaped deficient crops, proposes that the Privy Council should cancel the duty on such occasions. He thus feels no compunction in leaving his darling fixed duty in the lurch. Nevertheless he maintains that a system of corn laws, with a fixed duty, would create a steady demand for our manufactures. How our manufactures could be exchanged for foreign corn, the duty on which would be liable to be abrogated at any time when the Privy Council thought the price of corn too high, *more* steadily than under a fluctuating duty, which would of itself cease when the price of corn was too high, it is difficult to conceive. Manufactures could not be exchanged for foreign corn, unless the inducement was held out to the foreigner that a less quantity of his corn than he now gives would be taken in exchange in future for a larger quantity of manufactures; but how that exchange could be more easily accomplished under a fixed than a fluctuating system which would pre-

sent similar prices, it is difficult to comprehend. The exchange of one manufacture for another may be steady, because the supply may be as steady as the demand, and the price will also be steady; but when corn is exchanged for manufactures, the exchange must fluctuate with the supply of corn, and the price will also fluctuate with the supply. But the supply of corn is not regulated by the demand, but by the seasons. The exchange must therefore fluctuate with the season, and so must the price. No law, whether of fixed or fluctuating duty, or of free importation, will ever render the price of corn steady; and hence every commercial undertaking, depending on that price, must partake of its unsteadiness.

Although the Reviewer says that the price of corn should have no influence in fixing the amount of duty on importation, yet it is evident that the efficacy of that duty, as a protection, must have reference to the cost of importing foreign corn, because the cost of importation influences prices in our markets. Feeling, probably, the impossibility of avoiding this conclusion, he gives the minimum cost of importing the best quality of wheat from Dantzig, as high as 55s. per quarter, including 7s. duty. He states, from Mr Jacob, that wheat at Warsaw, is 28s., the expenses incurred till it is put free on board at Dantzig, 12s., and freight to London, 8s.—48s., and duty 7s.; in all 55s. per quarter. Mr H. Lander, who also gave evidence before the House of Lords in 1827, says that wheat could be bought in the country of its growth at 7s. or 8s. and the highest at 12s. per quarter. The transit of corn down the rivers is always tedious and destructive; it therefore costs from 9s. to 14s. 6d. per quarter, making the cost, when warehoused at Dantzig, 26s. 6d. Indeed it is well known by the importers of wheat from Dantzig, that, could the Polish proprietors reckon on receiving 26s. per quarter, on delivery at Dantzig, they would be perfectly satisfied.

It is quite unfair to charge freight, metage, insurance, &c. as essential items in the cost of importation of foreign corn; because all the disposable grain of our farmers is also shipped to their destination, whether to London or elsewhere, and the costs of shipment, &c. are as high here as at Dantzig. The freight from Dantzig is only [illegible] per cent. with the trade open to competition, whereas foreign vessels are prohibited entering our coasting-trade. The true method of ascertaining the value of foreign and home corn is to deduct every item of expense which is common [illegible] and then see the balance; and, if this be done, the finest wheat from Dantzig, with the Reviewer's duty of 7s. per quarter,

would only cost 33s. per quarter. This information is obtained from people who are quite competent to give the most minute information on the foreign corn trade.

That is the cost of importing the best quality of wheat from Dantzig, Elbing, and Koningsberg; but excellent red wheat, as good as our own, comes from Stettin, Rostock, and Wismar. The wheat from Hamburgh is certainly inferior in quality, and its price is proportionally low, but the access to that port is so easy that much of it would be imported at the low duty of 7s. Confectioners, and the higher class of bakers, may use only the finest quality of flour; but as bad bread is no uncommon article in this country, it must either be made of inferior wheat flour, or good flour adulterated with bean or barley flour. Were a boon held out for the importation of inferior wheat, by the imposition of a low fixed duty, the people of this country would soon not get a pure loaf of bread to eat. Bread made of inferior flour would be sold low enough in price, and thousands of poor creatures would be found to buy it; but would the Legislature be justified in encouraging the labouring class being poisoned by unwholesome bread, merely that the price of corn may be nominally low in the market? The sale of even adulterated bread, at a low price, would be seized as a strong argument to reduce the wages of the labouring population. Less wages and worse fare would be a poor recompence to the labouring man for constant work in a factory.

The Reviewer frankly admits that the agricultural interest has a right to protection, in proportion to the burdens which they exclusively bear. These burdens, he conceives, could not affect the price of corn raised in Britain above 4s. or 4s. 6d. per quarter, but as he is disposed to act generously towards any particular interest which may be singled out as the object of particular legislation; he is willing to grant 7s. per quarter. The exclusive burdens which the landed interest bears he estimates at L. 12,000,000 a-year. It is impossible even to approach to a correct calculation of the exclusive liabilities of the landed interest, but we should think that L. 12,000,000 would not cover the expenses of poor-rates, tithes, county-rates, rogue-money, jail-rates, bridge-money, and the statute-labour money. We should estimate the amount nearer L. 20,000,000 than L. 12,000,000. The gross produce of corn, in Britain, the Reviewer estimates at 42,000,000 of quarters a-year, which, at 7s. per quarter, gives a little more than L. 12,000,000. We have somewhere seen the produce stated at 52,000,000 quarters and

upwards, but no reliance can be placed in such statistical returns. So that, according to the Reviewer, 7s. of fixed duty is rather more as a protective duty than the agriculturists are entitled to. We should be inclined to say that 8s. should be the lowest sum for that purpose.

The Reviewer deprecates the adoption of any measure that would injure our agriculture, and thinks the importation of foreign corn at a low fixed duty would have no such effect; but it is obvious, that, as long as the foreigner can grow his corn at less expense than the British farmer, importation of foreign corn at a low duty must have the effect of depressing prices in our markets; and if prices will not remunerate, it will be impossible, in such a climate as ours, to maintain the fertility of land. Its fertility must always be supported at a great expense. The most obvious effect of foreign competition on our agriculture, would be a diminished supply of home grown corn; the diminution however would not be produced, we think, in the manner in which it is generally supposed, by throwing the inferior land out of cultivation altogether. To obviate this objection, the Reviewer proposes to throw it into pasture, and as it will then require no trouble, it will still retain its rent. Inferior soil can never grow good permanent pasture, the best land can only do so; the inferior, to produce any thing profitably, must be kept under the plough. Besides, the inferior soil is chiefly devoted to the growth of turnips and barley. If it was thrown out of arable culture, the barley which it grows must either be relinquished, or if barley must still be grown, it must occupy the better ground appropriated to wheat. The effects of throwing the inferior land out of arable culture, would diminish the growth of turnips and barley or wheat. But the diminution would not take place, as we have already said, in the way supposed, and assented to by the Reviewer. Inferior soil abandoned by the plough would soon be covered with furze, broom, or coarse herbage, as unfit for the use of live-stock as the uncultivated heath at present existing. As farmers are unwilling to abandon altogether the soil which has cost them much trouble and expense, the inferior land would most probably be still retained in the rotation of cropping. But instead of being only two years in grass, as under the present rotation, the low price of corn would cause it to be kept a longer time in grass, and when broken up again, would return more profit than if left to grow coarse pasture. The whole quantity of corn grown in the country would be considerably diminished by this process, but it would preserve the inferior land better than the abandonment of it.

'he Reviewer would fain flatter the landlords into the belief, that
:he fall which would take place in the price of corn in conse-
nce of foreign importation, would have very little effect; for
ign corn could not be imported at a lower price than 50s. per
rter; and as the landlords have already stood their ground
1 a fall of from 86s. to 61s. in ten years before 1820, they
ld now easily sustain a fall from 61s. to 50s. But he seems to
et that the rent of land during the ten years before 1820, was
portionally not so high as the price of corn, which was acci-
tally raised at that period by two very bad harvests. Besides,
t valid security have landlords that the price of corn will not
under 50s. when we have seen by other evidence than that of
Reviewer's, that foreign wheat may be imported at 33s., and
n the weekly average in our own markets is, at this present mo-
t, no more than 48s. 7d? He states it as a general opinion,
landlords have suffered more than any other class; and he de-
that it is the case. We must say, we never before heard such
port. Farmers have undoubtedly suffered the most, and the
urers the least. Landlords can only suffer by a reduction of
. Rents have not fallen so much as prices; because, as we
said, they never rose so high as prices, though considerable re-
ions have already taken place in them, at least 25 per cent. But
not to be expected that the rent of land will fall to its former level,
: the state of great fertility the land has attained, and its powers
roduction being increased several fold, by superior cultivation.
he Reviewer cannot agree with the statement of the last Agricul-
l Committee, that the growth of wheat has diminished during
ast ten years, and that agriculture has retrograded; because, he
ntains, that the population has increased two millions, and the
le people are better fed than before. Unemployed agricultural
urers have increased in number these last ten years, and they,
ast, surely cannot be better fed than they were when employed.
ay be doubted, however, that the growth of wheat has dimi-
ed in this country, though the growth of all kinds of corn has
inly diminished, and agriculture is certainly retrograding.
us only look into the farms and stack-yards, and we will glean
1 better data than from any returns. We will find that wheat
w grown, in many instances, after grass, instead of oats; that
invariably sown after potatoes, the cultivation of which has ex-
ed beyond all former precedent; and that much is sown after
ps in spring, whenever the weather will permit the operation.

We have no doubt that all these circumstances combined will have increased the growth of wheat, and its cheapness has increased its consumption by labourers. But, on the other hand, that the land is generally not so well worked, being now worked with pinching economy, will be undoubted by those who will take the trouble to inspect the state of the fields. The fences and ditches are less attended to. The horses do not shew the same condition and mettle on the roads. Do we see as many old stacks in the stack-yard at Michaelmas, or as many and large farmers' deposite-accounts in the banks, as formerly? When a farmer is pinched for money, is it likely that he will work his land with much spirit? when he carries on his farm from hand to mouth, can he buy lime for his land, or employ extra labourers? and yet how could the land have been brought to a high state of cultivation, and the cultivation so extended, if all these means had not been formerly employed? Will any man say, that all these means of improvement are employed as actively now as they were? We may depend upon it, if not only the ordinary work, but improving work, is not carried on with spirit on a farm, the fertility of the soil must retrograde, and the general produce diminish along with it. It is a great mistake in the Reviewer to assert, that farmers have not yet learned to accommodate themselves to the altered state of things. They are as altered in their views and condition as it is possible to conceive. They now indulge in few luxuries. Few now join in the chase; they will not even run the risk of breeding blood horses. They are content to jog to market on a hackney or pony. Few now keep a leash of grey-hounds, or carry a double-barrel. Few now receive their friends at a hospitable board and a bottle of wine. Few now remain to dinner in town on market days. Instead of indulging in all these luxuries, as they were wont, they remain at home till business takes them from it; and when they go from home, they try to return to it with expending as few shillings as possible. They go about the fields in as humble a garb as a gentleman's gamekeeper. This change in their condition may be all proper; it may be better for them and the nation. They would be content with it if they saw a bottom to their fall; but it shews that the Reviewer is either not acquainted with their condition, or he wishes to make out a better case for them than they can for themselves. It is perhaps true, they are not worse off than the other classes now engaged in industrious undertakings. We are only sorry that others should feel similar privations. We will, however, do what we can to expose the

fallacious statement, that the capital of the farmer is increasing rather than diminishing, as the Reviewer seems disposed to insinuate. We differ, *toto cœlo*, with the Reviewer, that farms being eagerly taken when they come into the market, is any sign of the prosperity of agriculture. Farmers cannot easily turn their hand to other occupations, and particularly when these are in no better state than agriculture. A farmer likes to lead a country life, and he cannot endure the thought of being immured in a town; and there is no occupation but farming to be obtained in the country. A farmer who has a working stock already gathered around him, cannot sell it without incurring a certain loss, and the same amount which he may have received for it, will not purchase a similar stock for a farm of similar extent, which he may choose to take a year or two afterwards. While he has a farm, he may go on with economy, and repay the money which he has probably borrowed at the outset; but if he attempts to dispose of his stock by sale, the certainly decreased sum which he will receive for it may not liquidate his debt, and leave him pennyless. A farmer having a wife and family depending on him for support, cannot support them so cheaply as on a farm. A farm will always ensure a living, in the first place, to the farmer. The possession of land is the strongest security any man can obtain. All these circumstances combine powerfully to maintain the demand for farms; but they may all operate, and do operate most injuriously, during a depressed state of agriculture.

The Reviewer conceives, that tenants in general can be little affected by a change in the corn-laws; and the particular case of the tenant who holds a long lease on a money rent, must just be taken into consideration by his landlord. But he keeps out of view that point of possible depression in the price of corn, which may not yield a greater sum than to pay only the expenses of cultivation, and a fair profit, without a rent. This, no doubt, would be an extreme case. No farmer, however, can remain on another man's land rent free. A certain quantum of rent must therefore be demanded on every species of soil. It is difficult, however, to institute a reduction of expenditure, but in that of rent alone, in the ordinary management of a farm. The farm labourers receive no more produce of the farm, as wages, than just supports them and their families. Horses get no more food than they can eat. The same quantity of seed-corn must be sown. The implements of h bandry cost money only at first, and they last a man's lif Farm, smith, and wright-work, in shoeing the horses, and keep

at a period of very great depression such as the present, when it is so difficult to realize grain of any kind, and the average price of wheat in England is only 48s. 7d., a price which cannot pay the expences of cultivation, rent, taxes, &c., it may be asked what would be the effect of an importation of foreign wheat, even to the extent of *half* a million of quarters, or the admission of the present stock of wheat in bond, amounting to 687,412 quarters. To any person acquainted with the corn trade of this country, it must be obvious that such an accession of supply would totally unhinge every branch of that trade, and recoil on the agriculture, commerce, and manufactures of the country to such a degree as for many months to unsettle every pending transaction. If any man can be found to say that the profits of the agriculturists are exorbitant, or the wages of the agricultural labourers are too high, he must be but little acquainted with the real state of these matters. It may be asked, is there any thing in the affairs of the landed interest in a flourishing state? Look only at the great fall in the price of land that has already taken place since the war; at the gradual and very large reduction in rents; at the decline in the value of all house property, as well in price as in rents; and is there a man that would conscientiously and deliberately say that the country would be benefited by any further depression, more especially were that depression brought about suddenly, and so extensively as this would be done by any material change in the corn laws at such a period as the present, when half the tenantry, and two-thirds of the landed proprietors are swimming for their existence? To any one who will take a calm and dispassionate view of the vast importance of agriculture to the social interests of this country, in the most widely extended sense of the subject, it must be quite apparent that in years approaching to famine, when we can in times of profound peace only draw supplies from the Continent to the extent of four and a half millions of quarters of all grain, a much smaller quantity than half a million would, at a period like the present of superabundance of grain (when there is not a single quarter of foreign grain in use in the country), have the effect of deranging the whole trade of the kingdom. Let the question be put, whether this country will be best supplied, and the price of grain be kept as steady as the nature of seasons will admit, by giving every possible encouragement to the agriculture of the United Kingdom, or by throwing ourselves upon the uncertain chance of obtaining a

For, by referring to the returns, it will be seen, that, in 1816, we imported, including Ireland, 1,193,071 qrs. of all grain:

In 1817,	do.	do.	2,501,039	do.	do.; and
In 1818,	do.	do.	4,738,520	do.	do.
			8,432,630 quarters,		

in three years of profound peace, and when the price of wheat was nearly double the present rate.

"The quantity of wheat consumed annually in this county, is estimated at 14,000,000 of quarters, and suppose that we wanted an additional supply of 2,000,000 of quarters, a quantity let it be kept in mind larger than has ever yet been imported in one year of foreign wheat, let me ask whether it would be most advantageous to the county to get this supply from abroad, or by encouraging home agriculture, raise it by means of our own capital and labour? Let us first, then, say that we shall take it from abroad, and that the cost is at the present low rate of 50s. per quarter. Then of course L.5,000,000 Sterling must be paid for it to foreigners, who, it is said, would take our manufactures in return. This of course is, however, an optional affair with the foreigner, who, if our prices are lower than where he gets his usual supply, may come to this country for a *part* of what he wants of manufactured goods; but where is the foreign country from whence we draw supplies of grain, that the taste, fashion, or habits of the people lead them to use any quantity of English manufactures? To all those countries from which we draw supplies of foreign grain, the amount of exports of manufactures is very small indeed, compared with the exports to countries from which we never get any supplies of grain, or at least such trifling quantities as to leave no proportion to our imports. This will be best exemplified by stating that our exports are about L.37,000,000, of which only L. 13,500,000 go to *Europe*, and the remainder to India, South and North America, &c.

"Let us now see what effects are produced by raising our 2,000,000 quarters at home. By this operation, who can deny that we have an actual disposable gain of the whole L.5,000,000 Sterling, for is not this amount actually taken out of the soil of the country employing (it may be calculated,) men, women, children, horses, &c.? In short the whole price being raised in the country is of course also spent there, with but some trifling exception of an absentee at most.

"Your repealers talk, too, of the advantages of reducing the price of butcher meat to the continental prices; but what is the cause of

the price of butcher meat being generally so low there? Can it be from any other cause, than that there is so much less demand for it? Indeed the use of butcher meat is only known to the better classes abroad, and, among the labouring classes, is as little known as turtle and venison amongst our labourers. Intelligent farmers, no doubt, can calculate the probable amount of butcher meat raised by the cultivation of any given quantity of grain, making it obvious at all events that the more grain cultivated the more butcher meat will be produced.

"We have only to look at the sailors of foreign ships coming to this country with produce of any kind, and often, and carefully as I have inspected them, I never saw an article on any one of their backs, heads, or feet, that could by possibility have been of British manufacture.

"In India and South America it is, I am told, quite refreshing to recognize at every turn the manufactures of England, most advantageously worn by the *decent folks* of these countries, who never gave us any corn whatever. They send us, however, their cotton which serves as so much *soil* for our manufactures to cultivate, drawing from it real wealth, as our agriculturists draw wealth from the earth.

"From Dantzig, from whence we derive our chief supplies of foreign *wheat*, the quality of the grain is so superior to the growth of this country, as to be intrinsically more valuable than the amount of any duty that could be established, as one of a permanent or fixed nature, shewing a great superiority of climate to that we are favoured with in this country, notwithstanding which, it is well known, that the peasantry of Poland are not only most miserably ill fed, but so wretchedly ill clothed, that no idea can be formed of it by any comparison we can make with any part of our own most humble population. When we look into Russia, from whence we also derive a very large proportion of the foreign grain imported, there is a still greater depth of misery and degradation to be found among the peasantry of that vast empire. The grain of Russia, however, bears all the characteristics of a superior climate, though it strongly indicates a low state of agriculture.

In the Appendix to the Report made, in 1826, by Mr Jacob, on the state of the corn districts of Germany, is a paper drawn up by M. Rothe, President of Government at Dantzig, relative to the condition of the agricultural peasantry in the kingdom of Prussia. In this paper we are informed that "the wages of agricultural labour

amount, on an average, to nearly 5*d.* a-day, which is generally paid in money ; payment in food being seldom given. It is rather customary that the labouring families who engage themselves on an estate, obtain tenements, garden-ground, and, in some cases, fuel. They pay rent for these, which is deducted at the settlement on quarter-day from the money they have earned. This price of labour, or amount of thirty dollars (4*l.* 10*s.* sterling) a-head annually, yielding no more than what a person wants for bread, salt, clothing, taxes, and minor objects, cannot,' says M. Rothe, 'be diminished without lessening the power of labour and its usefulness," —in other words, their subsistence is so bare, that any diminution would enfeeble their bodies, and probably shorten their lives.

" To the foregoing description, Mr Jacob adds the following remarks :—'The working classes—both those who work for daily wages and those who cultivate their own little portion of land—cannot be compared to any class in England. This large description of the inhabitants (upwards of a million) live in dwellings provided with few conveniences, on the lowest and coarsest food; potatoes, or rye, or buckwheat, are their chief, and frequently their only food. Linen, from flax of their own growth, and wool, spun by their own hands, both coarse, and both worn as long as they will hold together, furnish their dress; while an earthen pot that will bear fire, forms one of the most valuable articles of their furniture.

" 'As fuel is abundant, they are warmed more by close stoves than by the shelter of their wooden or mud houses, covered by shingles, which admit the piercing cold of the severe weather through abundant crevices. If they have bees and a plot of chiccory, their produce serves as a substitute for sugar and coffee ; but, too often, these must be sent to market, to raise the scanty pittance which the tax-gatherer demands. In common seasons this description of people suffer much in the winter, but in times of scarcity their distress and their consequent mortality are largely increased."

" 'The peasants of Poland,' says Mr Jacob, 'live in wooden huts covered with thatch or shingles, consisting of one room, with a stove, around which the inhabitants and their cattle crowd together, and where the most disgusting kinds of filthiness are to be seen. Their common food is cabbage, potatoes sometimes, but not generally, pease, black bread, and soup, or rather gruel, without the addition of butter or meat. Their chief drink is water, or the cheap whisky of the country, which is the only luxury of the peasants,

and is drunk, whenever they obtain it, in large quantities. In their houses, they have little that merits the name of furniture; and their clothing is coarse, ragged and filthy, even to disgust."

It has been stated that we can get any quantity of wheat and flour from the United States, but the largest importation we have ever had from the United States and our own North American Colonies, was in 1817, when we got 311,436 quarters from the United States, and 25,197 quarters wheat and flour from our North American Colonies. The import from Canada has since increased considerably, but it appears evident that the wheat is chiefly the growth of the States smuggled into Canada, in consequence of the very favourable terms on which Canadian wheat is admitted into the country in comparison with foreign wheat. The total quantity imported from the United States and Canada from 1800–1825, a period of 26 years, was only 2,571,052 quarters. The largest quantity imported from the British North America Colonies, was in 1830–31, when it amounted to 225,240, when it was computed the previous year that 80,000 or 100,000 quarters was the greatest quantity that could be sent to this country.

FOREIGN CORN MARKETS.

THE very languid state in which the foreign corn trade has remained during the last quarter, deprives the subject of all interest at the present moment, when we have plenty of corn at home selling at very low prices. The following quotation of prices will serve to show the foreign prices at some of the best shipping-ports:—At *Danzig*, on January 17. 1834, there were upwards of 14000 lasts of wheat on hand, and the prices were for high mixed from 28/ to 32/, mixed 24/ to 27/, ordinary and red 22/ to 26/ ℔ quarter free on board, weight equal to 60 lb ℔ bushel. Freights are expected to be 4/ ℔ quarter to the east coast of England. At *Rostock* on 23d January, the better descriptions of wheat were selling at from 26/ to 27/ ℔ quarter. At *Iesloe* at the same date, good wheat could not be purchased under 25/ or 25/6 ℔ quarter. The rainy state of the weather along the southern shores of the Baltic, and the demand from Russia, keep the corn markets at the above mentioned ports more firm than they would otherwise be. From *Hamburg* they write thus of the state of prices on 31st January:—

"HAMBURGH, 31*st January* 1834.—Our corn market has been much more animated during this week than for a considerable time, immense tracts of land laying under water leads to the belief that winter corn must have suffered severely. This and the known want in Russia, has given a spirit to speculators, and wheat has been consequently much more inquired for, and a trifling advance may be generally quoted.—Fine old red marks, 61½ lb ℔ bushel, 30/3 ℔ quarter free on board; do. new red marks, 61½ lb 29/3 to 30/10; new red Mecklenburg, 60 lb to 60½ lb, 24/6 to 25/6; old red Magdeburg and Anhalt, 59 lb to 59½ lb, 28/7 to 29/3; new do. 59½ lb to 60 lb, 28/3 to 28/7 s the same prices are willingly paid on delivery, for which some bargains are made. Rye is also, since a few days, more inquired after. Barley is more disposable, and for good malting Magdeburg and Anhalt 48½ to 50 lb ℔ bushel, 19/3 ℔ quarter have

n paid. Oats—the arrivals are very small, and prices for home consump- i are consequently firmer at the last quotations. Peas are more scarce, less in demand. Beans are held at fully the late prices, but no business ıg. Rape-seed, here, on the spot, we have no stocks whatever, and the ntry speculators having the same knowledge and feeling about the floods, p entirely back from the market, and their demands being exorbitant, re is no business: it is impossible to give a quotation, and prices are no- ıal. Clover-seed entirely without demand. Linseed cheaper. Rape and ;eed cakes are inquired for, the former at 77/ ℔ ton, the latter 134/6 ℔ ton, the spot. Rape-cakes in the Baltic at 72/ ℔ ton."

ıs no satisfactory account of the state of the harvest on the Continent had ched us at the closing of our last number, the following account from *mbury*, of date 13th December 1833, may prove interesting, and it will ve as a record of the result.

Hamburgh, 13th December.—We beg to hand you the following state- nt of the result of our harvest, the particulars of which we have selected n the most authentic sources, and which will, we flatter ourselves, be found rect:—Wheat must, on the whole, be taken as an average crop, in regard juantity; the weight is also generally heavy, but much is flinty; some quite free from sprout, and the colour not quite so fine as we have some- es seen it. In Anhalt, and the neighbourhood of the Saale, the crop is tainly short of an average, and the quality varies exceedingly, as well as weight; some parcels may be selected weighing 61 lb. to 61½ lb., whereas generality will not exceed 60 lb. per bushel, some being only 58 lb. to 59 lb.; colour is rather dull, and the wheat much mixed with lean and ricy corns. ım Magdeburg and the Mark we have already had large supplies, which 'e of very fine quality, though, as usual, rather ricy; the colour good, and ght from 61 to 62 lb., some even 63 lb. per bushel; the crop there is con- ;red to be a full average. Mecklenburg delivers an average crop of fair lity. The wheat harvest on the east coast of Holstein has been most ndant; it was well got in, and weighs fully 61½ lb. per bushel: on the :t coast both quality and weight are good, but a great deal comes to the 'ket ill-conditioned. The harvest in Silesia is said to have turned out in- 'erently in every respect, but we are yet without accounts from that coun- or Bohemia on which we can place reliance. Barley, in the neighbour- d of Magdeburg and the Saale, suffered much from rain during the har- t, and the result is unsatisfactory, both as regards quality and quantity; weight is from 47 lb. to 49 lb., still some good rather heavier, malting par- may be selected, but we cannot expect large supplies from thence, unless prices advance, as the farmers are using it for feeding, on account of the 'city of green food and oats. The crop in Holstein, Denmark, and Meck- ıurg, particularly in the former country, is very large, and quality gene- y fine, though some has also there suffered from the rain; the average ght of fine malting barley is, in Holstein 53 lb., in Mecklenburg 52 lb.; ıish six-rowed barley is very fine, weighing 50 to 51 lb. per bushel. Oats in respect to quality, a good crop, the colour being bright, and weighing erally from 38 lb. to 39 lb., on the east coast of Holstein, in Denmark and 'den, and about 37 lb. in the neighbourhood of the Elbe; the quantity ut small. Beans are, on the whole, rather under an average in quantity, ;icularly on the coasts of the Elbe, where they were also housed in damp dition; in Jeverland and the neighbourhood of the Weser, both quality condition are very good. The crop of pease is large, but we never remem- seeing a greater difference in the quality, a small proportion being very , some exceedingly bad, and the bulk ranging between the two extremes; se from the Saale are best in appearance, but generally bad boilers; most 'els are much mixed with greenish pease, which, however, become quite ow when boiled. The crop of rye is a bare average, quality and weight erally good; that of buckwheat is almost a failure. Tares, on the Hano- an coast of the Elbe, are a good crop, and of very fair quality, but in ımark short and poor. Rapeseed, on the whole, was a good average crop :he coasts of the Elbe, Weser, and Jhade, but on the east coast of Hol-

stein the quantity was small, and the quality generally such as to be unfit for shipment. Owing to the large shipments to France, which took place early in the season, and the considerable quantities lost, or greatly damaged during the severe storms in September, our stocks of fine quality are every where very small, and in some parts totally exhausted. The crop of linseed was large in Holstein, and generally of a fine bright colour; in Hanover, also, a good deal has been harvested, but not of such fine quality: several shipments have been made from our coast, and also from the east coast of Holstein, and some parcels are now offering for delivery in the spring at ports of the Baltic. White clover-seed is a fair crop, but only a small part of superior quality, the general runs being only middling; red is defective, and all the arrivals poor and unclean. Owing to the dull and inanimate state of the foreign markets, the prices of all grain, particularly in the Baltic, are now at a very low standing, and purchases can be made with the condition that the grain is to lie free from loss of measure and all expenses till the end of April, with an advance of only one-third of the amount, at rates which seem to exclude the possibility of a loss, even if England should not require any import before another harvest, as, from the very small produce of Russia, we shall this year have to supply those countries which formerly received their corn from thence, and probably have to make shipments direct to Russia, if the accounts received from all parts of that empire are not totally false. In the course of this month all the farmers in the country have large payments to make for rent, &c., and will then of course be very desirous of selling their produce, which may reduce the prices a trifle further, and in every respect render it the most suitable time for making purchases, but after that period the stocks will be generally in the hands of monied speculators and farmers who can afford to hold their corn, so that there will be no prospect of any further fall, but, on the contrary, every probability of higher prices."

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of January 1833, *and 5th of January* 1834, *showing the Increase and Decrease on each head thereof.*

	Quarters ended January 5.		Increase.	Decrease.	Years ended January 5.		Increase.	Decrease.
	1833.	1834.			1833.	1834.		
	£	£	£	£	£	£	£	£
Customs, . .	3,887,306	3,594,287	..	293,091	15,559,982	14,946,988	..	612,994
Excise, ...	,966,488	4,264,493	298,005	..	14,657,221	14,840,962	183,741	..
Stamps, . . .	1,575,955	1,575,112	..	843	6,515,344	6,498,686	..	16,658
Post-Office,	338,000	324,000	..	14,000	1,323,000	1,386,000	63,000	..
Taxes, ...	1,902,823	1,808,701	..	94,122	4,943,885	4,892,058	..	51,827
Miscellaneous,	34,729	27,046	..	7,683	59,853	57,133	..	2,720
	11,705,301	11,593,639	298,005	409,739	43,059,185	42,621,827	246,741	684,199
	Deduct Increase, . .			298,005	Deduct Increase, .			246,741
	Decrease on the quarter,			111,734	Decrease on the year,			437,458

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 1.	54 1	32 7	20 11	35 6	41 0	34 3
8.	54 7	32 6	20 10	35 0	41 6	33 11
15.	52 9	32 10	20 11	36 0	42 0	34 6
22.	53 8	32 8	20 11	37 0	42 0	35 0
29.	52 9	32 9	20 8	38 0	41 6	34 9
Dec. 6.	52 9	32 5	20 9	35 6	40 6	33 10
13.	51 3	30 11	20 10	34 8	40 6	34 9
20.	52 3	30 8	20 11	33 1	40 8	33 10
27.	52 8	30 1	20 1	33 0	39 6	33 1
1834.						
Jan. 3.	52 1	29 7	20 6	32 4	40 2	32 11
10.	51 9	29 5	20 2	31 10	39 2	31 8
17.	52 5	29 4	20 1	32 6	38 6	31 9
24.	51 6	29 0	19 8	34 0	36 6	31 6

DUBLIN.

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	P
1833.	s. d.	s. d.	s. d.	s
Nov. 1.	23 0	12 0	10 6	
8.	23 10	11 9	11 0	
15.	24 1	12 3	11 7	1
22.	23 11	12 0	11 3	1
29.	23 10	12 6	10 6	
Dec. 6.	24 0	12 3	11 0	1
13.	23 2	12 4	11 2	
20.	23 0	12 2	11 4	
27.	22 8	12 2	11 2	
Jan. 3.	22 3	12 4	11 0	
10.	22 1	13 1	10 10	
17.	22 9	12 10	11 2	
24.	23 0	12 9	11 4	

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1833.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 5.	48 2	29 9	18 7	35 0	40 0	40 1
12.	47 3	27 2	18 6	34 6	40 6	37 9
19.	46 9	27 1	18 2	35 0	39 6	36 9
26.	46 8	26 11	18 5	36 0	40 10	35 10
Dec. 2.	46 10	26 0	18 8	37 0	41 6	34 1
9.	45 7	28 5	18 9	36 0	42 0	34 2
16.	45 7	28 9	18 6	36 2	41 6	37 4
23.	46 0	28 6	18 7	35 6	40 6	38 4
30.	45 10	28 4	18 4	35 0	40 0	37 8
1834.						
Jan. 6.	44 11	28 7	18 7	34 6	38 6	38 2
13.	44 10	26 3	18 9	34 6	38 0	35 9
20.	45 1	27 9	18 1	32 6	37 4	34 10
27.	44 10	28 2	18 1	32 0	36 0	34 0

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	
1833.	s. d.	s. d.	s. d.	s
Nov. 6.	57 2	29 6	20 0	3
13.	56 6	28 10	19 1	3
20.	55 1	28 1	19 0	3
27.	56 5	28 6	19 3	3
Sept. 4.	53 5	27 7	19 2	3
11.	53 4	26 9	18 10	3
18.	51 4	26 10	18 6	
25.	50 0	27 10	18 7	
1834.	50 0	26 5	18 0	
Jan. 1.				
8.	51 1	26 1	17 6	2
15.	50 8	27 1	18 1	2
22.	51 9	27 5	17 8	2
29.	52 4	27 0	18 0	2

TABLE showing the Weekly Average Prices of GRAIN, made up in terms o Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on CORN ; the Duties payable thereon, from 1st November 1833, to 1st February

	Wheat.			Barley.			Oats.			Rye.			Pease.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1.	51 7	52 1	34 8	30 10	30 9	16 10	20 0	19 11	18 3	35 6	35 5	16 9	40 9	40 11	9 6
8.	51 6	51 10	35 8	31 2	30 10	16 10	19 10	19 10	18 3	34 3	35 2	16 9	42 0	41 4	8 0
15.	51 4	51 7	35 8	31 2	30 9	16 10	19 9	19 10	18 3	35 5	35 0	16 9	40 11	41 5	8 0
22.	50 11	51 5	35 8	30 8	30 9	16 10	19 11	19 10	18 3	38 1	34 10	18 3	41 7	41 6	8 0
29.	50 2	51 2	35 8	30 2	30 9	16 10	19 10	19 10	18 3	35 8	34 8	18 3	40 6	41 3	8 0
6.	49 8	50 11	36 8	29 10	30 8	16 10	19 8	19 10	18 3	34 5	34 8	18 3	40 5	41 0	8 0
13.	49 5	50 6	36 8	29 4	30 5	16 10	19 5	19 9	18 3	34 9	34 7	18 3	40 1	40 11	9 6
20.	49 5	50 2	36 8	28 6	29 11	18 4	19 2	19 7	18 3	33 0	34 5	18 3	39 9	40 7	9 6
27.	49 2	49 10	37 8	28 4	29 6	18 4	18 10	19 6	18 3	30 4	33 7	19 9	38 9	40 2	9 6
4.															
3.	49 2	49 6	37 8	27 11	29 0	18 4	18 11	19 4	18 3	31 10	33 5	19 9	38 5	39 8	11 0
0.	49 2	49 4	37 8	28 2	28 8	19 10	18 9	19 2	18 3	33 0	32 11	21 3	38 2	39 3	11 0
7.	49 1	49 3	37 8	28 0	28 4	19 10	18 8	18 11	19 9	33 8	32 10	21 3	36 8	38 8	12 6
4.	48 10	49 2	37 8	27 0	28 1	19 10	18 2	18 9	19 9	29 9	32 0	21 3	36 3	38 0	12 6

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Q
Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; th
upon which duties have been paid for home-consumption, during the same Month; and
tities remaining in Warehouse at the close thereof: from 1st November 1833, to 1st Jan

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WA	
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.
Nov. 1. 1833.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	19,246 3	774 6	20,021 1	330 4	2,426 0	2,756 4	631,192 1	38,959 7
Barley, . .	11,725 1	..	11,725 1	16 0	..	16 0	72,841 0	..
Oats, . .	367 1	..	367 1	74 0	..	74 0	214,789 4	..
Rye, . . .	..	..	..	..	..	..	5,848 2	..
Pease, . .	2,016 7	..	2,016 7	743 4	..	743 4	29,973 5	..
Beans, . .	4,528 0	..	4,528 0	4,414 6	..	4,414 6	..	..
Totals, .	37,883 4	774 6	38,658 2	5,578 6	2,426 0	8,004 6	954,644 4	38,959 7
Dec. 1.								
Wheat, . .	16,958 1	6,966 5	23,924 6	215 2	42,391 2	4,454 4	647,127 6	40,284 5
Barley, . .	18,310 5	..	18,310 5	1,166 6	..	1,166 6	89,932 5	..
Oats, . .	10,707 4	..	10,707 4	375 4	..	375 4	225,275 4	..
Rye, . . .	..	..	..	..	..	..	5,720 2	..
Pease, . .	5,072 1	10 6	5,082 7	5,469 0	10 6	5,479 6	3,988 7	..
Beans, . .	4,107 0	..	4,107 0	537 6	..	537 6	33,557 0	..
Totals, .	55,235 3	6,977 3	62,212 6	7,764 2	4,250 0	12,014 2	1,006,322 0	40,284 5
Jan. 1. 1834.								
Wheat, . .	7,747 5	6,752 4	14,500 1	124 6	3,273 0	3,394 6	649,425 6	44,636 3
Barley, . .	8,526 0	..	8,526 0	18 2	..	18 2	98,368 2	..
Oats, . .	1 2	..	1 2	1 2	..	1 2	224,231 5	..
Rye, . . .	..	..	..	..	..	..	5,720 2	..
Pease, . .	4,713 5	..	4,713 5	8,386 7	..	8,386 7	349 7	..
Beans, . .	3,671 7	..	3,671 7	62 7	..	62 7	37,223 0	..
Totals, .	24,660 3	6,752 4	31,412 7	8,594 0	3,273 0	11,864 0	1,015,318 6	44,636 3
Nov. 1. 1833	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb	wt. qr. lb	cwt. qr. lb	cwt. qr. lb	cwt. qr. lb
Flour, . .	10,071 3 0	10,006 3 12	20,078 2 12	14 2 22	5,659 2 13	5,674 1 7	409,776 2 12	28,935 3 18
Oatmeal, .	..	..	..	..	..	..	..	82 2 11
Totals, .	10,071 3 0	10,006 3 12	20,078 2 12	14 2 22	5,659 2 13	5,674 1 7	409,776 2 12	29,038 1 29
Dec. 1.								
Flour, . .	9,505 3 8	9,216 0 4	18,721 3 12	16 1 10	2,102 2 2	2,118 3 12	410,303 2 16	32,373 2 20
Oatmeal, .	..	..	..	..	..	..	..	82 2 11
Totals, .	9,505 3 8	9,216 0 4	18,721 3 12	16 1 10	2,102 2 2	2,118 3 12	410,303 2 16	32,456 1 3
Jan. 1. 1834.								
Flour, . .	3,641 2 19	13,047 2 14	16,689 1 5	10 2 17	4,396 1 16	4,407 0 5	405,408 2 0	44,654 3 28
Oatmeal, .	..	..	..	..	..	..	..	82 2 11
Totals, .	3,641 2 19	13,047 2 14	16,689 1 5	10 2 17	4,396 1 16	4,407 0 5	405,408 2 0	44,747 2 7

PRICES of BUTCHER-MEAT.

Date.	SMITHFIELD, *Per Stone of* 14 lb.		MORPETH, *Per Stone of* 14 lb.		EDINBURGH, *Per Stone of* 14 lb.		GLASGOW, *Per Stone of* 14 lb
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutt
1833.								
Nov.	7/ @ 7/3	7/6 @ 8/	6/6 @ 7/6	6/9 @ 7/6	6/6 @ 7/3	6/ @ 7/	7/ @ 7/3	6/6 @
Dec.	6/9 7/6	7/ 7/9	6/9 7/6	6/9 7/9	6/3 7/	6/3 7/3	6/6 7/3	6/6
1834.								
Jan.	6/6 7/3	7/ 7/6	6/ 7/3	6 7/6	5/9 6/6	6/ 6/6	6/3 7/	6/3

PRICES of English and Scotch WOOL.

... 16 lb.—*Merino*, Washed, 33/ @ 36/6; in Grease, 26/ @ 30/6.—*South Down*, 25/6 @
...cester, 20/ @ 20/4; Ewe and Hogg, 24/ @ 26/6.—Ewe, 23/ @ 25/6.—*Locke*, 18/ @ 21/6; *Moor*, 14/6
...rch, per 24 lb ...*icester*, 30/6 @ 42/; Ewe and Hogg, 32/6 @ 36/.—Ewe, 28/ @ 31/6.—*Cheviot*,
... @ ... @ ... 6; *Moor*, White, 19/ @ 21/; Laid, 15/9 @ 16/6.

INDEX.

Agricultural Exhibition at Stirling, 406.—Statistics, on, 704.

Agriculture, of the Forth and Bargy, in Wexford, Ireland, 187.—of the county of Galway, in Ireland, 625.—on Irish, 296.—of the Tropics, notice of a book on the, 565.—Of the county of Wexford, in Ireland, 529.—on the application of vegetable physiology to, 562.

Aiton, Mr Wm. on the characteristics of cattle, 485.—on the dairy cattle of Ayrshire, 763.—on the Dairy husbandry of Holland, 328.—on the cultivation of flax in Holland and in Scotland, 159.

Alnwick Castle, description of the dairy at, 157.

Ballingal, Mr Robert, on the cleansing of high roads, 875.

Bell's reaping-machine, on the working of, 84.

Blackadder, Mr Wm. on the probable reversion of wheat into grass, 699.

Bone-dust, on an economical mode of applying, to raise turnips, 58.—comparative trial of it and stable manure for raising turnips on a clay soil, 835.

Boswell, John, Esq. on the unprofitableness of permanent pasture compared with new, 783.

Brown, Mr William, on a method of preventing the attacks of catterpillar on fruit-trees and bushes, 369

Butcher meat, prices of, at Smithfield, Morpeth, Edinburgh, and Glasgow, 124, 284, 438, 598, 762, 920.

Canada, forest sports of, 459.

———, Upper, remarks on, as a country for emigrants, 208—emigration to it as a means of relieving the parishes in England of paupers, 837.

Cattle, of the Ayrshire dairy, 763—on the characteristics of, 485—disease in, called crochles, 480—on the management of, during the prevalence of epizootic diseases, 601—cases of disease in the heart of, arising from the swallowing needles and pins, 221—on tumours in, 554.

Cheese, description of a curd-breaker for skim-milk, 384.

Chiccory, on the culture of, 206.

Clergy, on the Scottish, 285.

Clover and turnip seeds, on the adulteration of, 89.

Clydesdale, on the orchards in, 814.

Corn, effects of low prices of, on agriculture and manufactures, 226—foreign average prices which regulate importation, 122, 282, 436, 596, 761, 919—monthly returns of, imported, charged with duty and remaining in warehouse, 123, 283, 437, 597, 762, 920—prices of, at London, Dublin, Liverpool, and Edinburgh, 122, 282, 436, 596, 761, 919.

Corn-crops, on the state of ripeness they should be when reaped, 497.

Corn markets, foreign, 124.—Hamburgh, 125.—Dantzig, ib.—Liebau, in.—Rostock, ib.—Lubeck, 126.—Wismar, ib.—284.—Dantzig, 441.—Koningsberg, 442.—Rostock, ib.—Odessa, ib.—Kiel, 598.—Antwerp, 599.—Kiel, ib.—Dantzig, ib.—Hamburgh, ib.—Resolutions for the permission to manufacture bread and biscuit for export from foreign corn, 600–759.—Hamburgh, ib.—German wool markets, 760.

Corn-trade, on the foreign, 643.

Cottagers' Garden Societies, on, 791.

Curd-breaker for skim-milk cheeses, description of a, 348.

Dairy at Alnwick Castle, description of, 157.

Dairy cattle of Ayrshire, 763.

Dairy husbandry of Holland, 328.

De Candolle's theory of the rotation of crops, 320.

Dick, Mr Wm. on a case of fistula in the horse, and cases of disease in the heart of cattle arising from their swallowing needles and pins, 221.—on tumours in cattle, 554.

Dimsdale, Mr Isaac, on the foreign corn trade, 643.

Donaldson, Mr John, on smut in wheat, 311.

Draining, on plug or clay, 501.

Dundee and Newtyle Railway, an account of, 1.

Education of the labouring class, 443.

Enclosures, on, 843.

English husbandry, 29.

English peasantry, on the present state of, 277.

Evans, W. S. Esq. on plug or clay, 501.
Excretory powers of plants, 656, 880 882.

Farm-houses, on orchards around, 346.
Farming Society of Ireland, its objects and effects, 511.
Fiars prices of the counties of Scotland for crop 1832, 438.
Forbes, Mr James, Hortus Woburnensis, review of, 725.
Flax, cultivation of, in Holland, 159.
Flour, foreign, monthly returns of imported, charged with duty, and remaining in warehouse, 123, 233, 437, 597, 762, 920.
Flour-making in Ireland, 48.
Fruit-trees on the training of standard, 293—on a method of preventing the attacks of caterpillars on, 369.

Galbraith, Mr Wm. on wheel-carriages, 683.
Galway, agriculture of that county in Ireland, 625.
Gorrie, Mr, on the cultivation of chiccory, 206.—on the training of standard fruit-trees, 293.
Grass-seeds, the kinds and quantities suited to alternate husbandry, permanent pasture, pleasure-grounds, &c. 714.
Greenhouses, on, 794.

Hawkins, Mr William, on the education of the labouring class, 413—on agricultural statistics, 704—on emigration to Upper Canada as a means of relieving the parishes in England of their pauper population, 837.
Heath, on burning it to render it an efficient pasture, 808.
Highland Society of Scotland, on extending the annual shows of, 53.
Holland, on the cultivation of flax in, 159—on the dairy husbandry of, 328.
Horse, on a case of fistula in the, 221.
Horses, a method of preparing food for, 378—advice to the purchasers of, review of, 703.
Hunter's Law of Landlord and Tenant, review of, 667.

Ireland, flour-making in, 48—on the agriculture of the baronies of Forth and Bargy in the county of Wexford, 187—on the objects and effects of the late Farming Society of, 511—on the agriculture of the county of Wexford in, 529—agriculture of the county of Galway in, 625.
Irish agriculture, on, 296—landlords, on, 388.

Laidlaw, Mr Alexander, on burning heath to render it an efficient pasture, 808.
Landlords, on Irish, 388.
Landlord and tenant, review of Hunter's book on the law of, 667.
Larch, on the decay of the heart wood of the, 547.
Lawson, Mr Charles, on the kinds and quantities of grass-seeds suited to alternate husbandry, permanent pasture, pleasure grounds, &c. 714.
Liquid manure, experiments with, 92.

Macaire, M., on the excretory powers of plants, 882.
Main, Mr, on orchards around farm-houses, 346—review of his book on Vegetable Physiology, 562—on vegetable physiology, 703—on the reversion of wheat into grass, 780.
Mann, Mr Joseph, reaping machine, description of, 250.
Manures, theory and practice in the application of putrescent, 76—experiments with liquid, 92—the theory of putrescent, 617—comparative trial of that from the stable and bone-dust for raising turnips on clay-soil, 835.
Maxwell, Mr Henry, account of a comparative trial of stable manure and bone-dust for raising turnips on a clay soil, 835.
Menteath, Esq. James Stuart, on cottagers' garden societies, 791
Miscellaneous Notices. Irish trade with England, 97. Comparative wealth of England and France, 98. Statistics,—number of persons in agriculture, trade and professions; assessments to property-tax 1814–15; profits on the productions of the soil and manufactures in Great Britain and Ireland in 1813, 98; protection afforded manufactures by duty, 99. Remarkable elevations, ib. On the benefits of field gardens for the labouring poor; by Captain Scobell, R. N. ib. Agricultural employment, 101. Rules for managing cottagers' allotments; cottages and land; labours and wages; religion, morals, and parish economy, 102. Plan for promoting the employment of superfluous labouring population, and, at the same time, conferring a great benefit on the land, ib. Ancient price of labour, 104. Chimney soot as a

manure, 105. On the cultivation of hemp, ib. Butter, 106. Adulteration of bread, 107. Loss of weight in cooking animal food, 108. To raise peas in autumn, 109. Obesity of geese, ib. Fondness of poultry for pepper, ib. Wine from potatoes, 110. Uses of the horns of cattle, ib. Domestic yeast, ib. On the distance to which spray of the sea may be carried, 111. Gialo Antico, ib. Salt mines of Saltzberg, ib. Indian coffee, 112. Peruvian bark, 113. The chapel oak of Allonville, ib. On the custom of planting yew trees in churchyards, 115. Tincture of roses, 116. The peach and nectarine trees distinguished by their germens, ib. Misseltoe, ib. The fraxinella, ib. The Scottish thistle, ib. Wild cotton tree, 117. Bats, ib. Serpents, ib. Teal, ib. The nightingale, 118. The instinct of wild ducks, ib. Mackerel burying themselves in the mud, 119. Mode of fishing in China, ib. Amount of the productions of our West India Colonies, 418. Estimate of the value of the West India Colonies, ib. Exports and imports of the West India Colonies, 419. Imports and exports of Ireland in 1801 and 1825, ib. Value of imports and exports of Ireland, and of the produce or manufactures exported from Ireland, ib. Consumption of tea in Ireland, ib. Consumption of coffee and sugar in Ireland, 420. Grants to the public charities in Dublin, 420. On the infertility of granite soil, by John Prideaux, Esq. and remarks on the paring and burning of granite soil, by Professor Rennie, ib. Experiments on buckwheat, 422. Method of obtaining cream from milk, ib. Swing frame for cheeses, 424. To produce two crops of kidney potatoes on the same ground in the same year, 567. Fecundity of the onion, ib. Otaheitean mode of preparing arrow-root, ib. Saxony wool, 568. Management of bees in Cashmere, ib. Manners of the fifteenth century, 570. Old English archery, 571. Carriages, 572. Ancient marks on paper, 573. The origin and progress of newspapers, 574. Calendar and almanac, 576; years, 577; months, 579; weeks, 580; days, ib. London post-office, 581. The water-spider, 582. The possibility of naturalizing the firefly, 583. Vocal machinery of birds, ib. Blasting rocks under water by means of the diving-bell, ib. The tessel, 584. The light of rushes, 585. The pearl fishery of Ceylon, ib. Stuffed animals, 588. Doll's eyes, 589. The Jew's harp, 590. The chiragon, or guide for the hand, 591. Prices of wheat in England from the reign of Philip and Mary to George II. 730. Malt-duty, ib. Hops, ib. Table of the population, produce, imports and exports, of the West Indies, 731. Valuation of the West India Colonies, ib. Statistics of brewing in England and Scotland, 732. Emigrants to Canada, ib. Committals in England and Wales, 733. Consumption of silk, ib. The lantern, ib. New tail-piece for the violincello, ib. On the savage state of man, 734. Misconceived influences of the moon, 736. Fertilization of old lavas, 737. On the culture of the garden bean, ib. To prevent the sprouting of store onions during the winter, ib. Saving peas and beans from mice, ib. On securing the fruitfulness of fruit-trees, ib. Golenos oak, 739. On the utility of planting ash, ib. To destroy moles in gardens, 740. Water in flour, ib. Compression of water, 741. Signs of rain, ib. Preservation of substances by means of alkalis, 742. Greenhouse plants, ib. The turnip-fly, 743. Experiments on smut in wheat, 744. Remedy for fruit-trees casting their fruit, 745. Discoloration of the leaves of the rose-tree, ib. The candleberry myrtle, 746. Oxalis crenata, a rival to the potato, ib. Crucible for fusion, 747. The chasseur ants of Trinidad, ib. White monkey, 749. Lawson's agricultural museum in Edinburgh, ib. Sinking Fund, 891. Dividends of stock, 892. Taxes repealed since the peace, 893. Taxation and the gold standard, ib. Statistics of Spain, ib. Commerce of the United States, 895. Comparative cost of building, provisioning, and sailing a vessel of 400 tons, for one year, from a Prussian and an English port, ib. Revolutionary victims in France, 896. Comparative health in England, ib. Average price of foreign wheat, 897. Wool and woollens, ib.

Munro, Mr James, on the transplanting of large trees, 183.

Oaks, a method of planting them at Levens in Westmoreland, 457.
Orchards around farm-houses, 346 —account of those in Clydesdale, 814.

Peasantry, on the present state of the English, 277.
Permanent pasture, Mr Sinclair on converting strong loam into, 45. —on a method of top-dressing, 386. —on their unprofitableness compared with new, 783.
Potatoes, on the preservation of, 482.
Porter's Tropical Agriculturist, notice of, 565.
Presser, on consolidating light soils with the, 543.
Prickly comfrey, on the culture of the, 369.

Quarterly Agricultural Report, 119, 425, 591, 751, 898.

Railway, an account of the Dundee and Newtyle, 1.
Reaping with the scythe, 350.
Reaping machine, on the working of Bell's, 84.—description of Mann's, 256.
Revenue, the, 124, 284, 438, 598, 760, 918.
Roads, on cleansing high, 875.
Rotation of crops, on De Candolle's theory of the, 320.

Scotland, on the tithe system of, 262. —on the clergy of, their stipends, manses, and glebes, 285.
Scythe, on reaping with the, 350.
Seed, corn, on a mode of covering without harrowing, 275.—on the destruction of, 535.
Sinclair, Mr George, on converting strong loam into permanent pasture, 45.
Smut in wheat, 311.
Soils, on consolidating the light sorts with the presser, 543.—on the raising of wheat on inferior, 727.
Somerville, Mr James T., remarks on Upper Canada as a country for emigrants, 208.
Stewart's advice to purchasers of horses, review of, 703.
Stirling, on the agricultural exhibition at, 406.
Straw and hay, on machines for cutting, 246.
Strawberry, on the culture of the, 509.
Sugar making in the West Indies, 56.

Tait, Mr Joseph, on a disease in cattle called crochles, 680.
Tithes, on the commutation of, by Rev. Mr Tryon, 127.
Tithe system of Scotland, 262.
Towers, Mr J., on the excretory powers of plants, 656.—On greenhouses, 794.
Trees, on the transplanting of large, by Mr Munro, 183.
Tropical agriculturist, notice of a book so called, 565.
Tryon, the Rev. John Thomas, on a plan for the commutation of tithes, and the improvement of the parochial economy of England, 127.
Tumours in cattle, 554.
Turnips and clover seeds, on the adulteration of, 89.

Vegetable physiology, on the application of it to agriculture, 562.
——— physiology, 713.

West Indies, sugar-making in the, 56.
Wexford, on the agriculture of the county of, 529.
Wheat, the reversion of, into grass, 699, 780.—on the raising it on inferior soils, 727.
Wheel-carriages, on, 683.
Wilson, Dr Charles, on the management of cattle during the prevalence of epizootic diseases, 601.—on the principles which regulate the treatment of simple wounds, considered with reference to veterinary practice, 853.
Woburn Abbey, review of Forbes's book on the garden of, 725.
Wool, prices of English and Scotch, 124, 284, 438, 598, 762, 920.
Wounds, simple, the principles which regulate their treatment, considered with reference to veterinary practice, 853

ERRATA.

Page 95, line 19, *for* 20,000 gallons *read* 2000 gallons
— 450, — 15, *for* slender *read* tender
— 453, — 20, *for* adduce *read* educe
— 456, — 14, *for* kind *read* mind
— 669, — 16, *for* imbedded *read* embued
— — 17, *for* compared *read* confirmed.

PREMIUMS

OFFERED BY

THE HIGHLAND SOCIETY OF SCOTLAND,

FOR PROMOTING

AGRICULTURE AND INTERNAL IMPROVEMENT IN SCOTLAND,

IN

1833.

CONTENTS.

Page

PRELIMINARY NOTICE, ... 5
Notice to Candidates, and General Regulations of Competition, . . 7
Office-bearers and Directors, ... 8

ESSAYS, PLANS, AND REPORTS.

1. Raising and managing Hedges, ... 9
2. Plans of Cottages, ... 10
3. Economizing Fuel and Lighting in Dwellings of the Labouring Classes, ib.
4. The Comparative Advantages of Feeding Live Stock on Raw or on Prepared Food, ... 11
5. Fattened Poultry, ... ib.
6. Sea-weed as a Manure, ... 12
7. Kelp as a Manure, ... ib.
8. Account of the Quarries in Scotland, ... ib.
9. Fine-woolled Sheep, ... 13
10. Plants used for Dyeing, ... 14
11. Extirpating Ferns from Pastures, ... ib.
12. Reports on Dairy Management in Scotland, ... ib.
13. Reports on Improved Rural Economy abroad, ... 15
14. Honorary Premium for an Account of any District in Scotland, . ib.

EXPERIMENTS AND IMPROVEMENTS.

CLASS I.—WASTE LANDS, ... 16
1. Honorary Premiums for Improvement of a specified Extent of Land by Tillage, ... ib.
2. Improvement of Land by the Settlement of Crofters, . . 17

CLASS II.—CROPS AND CULTURE, ... 18
1. New Plants adapted to Field Culture, ... ib.
2. Management of the Potato Crop, ... ib.
3. Varieties of the Potato for Field or Farm Culture, . . 19
4. ..... Garden Culture, . . . ib.
5. Feeding off Turnips by Sheep, ... 20
6. Ploughing Competitions, ... 21

CLASS III.—PASTURES, ... 22
1. Laying down Lands to Permanent Pasture, . . . ib.
2. Comparative Advantages of laying down lands to Pasture with and without a White Crop, ... ib.
3. Saving the Seeds of Natural Grasses, ... 23
4. Collecting the Seeds of Native Leguminous Plants, . . 24

PRELIMINARY NOTICE.

THE business of THE HIGHLAND SOCIETY OF SCOTLAND is conducted by a President, Four Vice-Presidents, Thirty Ordinary, and Ten Extraordinary Directors, a Treasurer, and Principal and Depute Secretaries, to which latter all communications are addressed. The Ordinary Directors are subdivided into Committees for the despatch of business, assisted occasionally by those Ordinary Members most conversant with the subjects to be discussed. The Report of each Committee is brought before the Directors collectively for farther procedure, and these proceedings are again submitted for approbation to a half-yearly General Meeting of the Society. One of the General Meetings is, by the Charter, appointed to be holden on the second Tuesday of January; the other on such day in the summer months as the Directors may fix; and the day so fixed is usually in the end of June, or early in July. New members are admitted at either of these General Meetings by ballot. They pay a small annual contribution, of £1 : 3 : 6, or, in their option, and in full of all future claims, a life-subscription of Twelve Guineas. All Meetings of Directors, or Committees, are open; and at these, any member may attend and deliver his opinion on the subjects under consideration, though, in cases of division, the Directors or Members of the Committees only are entitled to vote. Members have access to the Society's Library, which is annually increasing, by the purchase or donation of books connected with the purposes of the institution.

When the Highland Society of Scotland was instituted in the year 1784, the object chiefly contemplated was the improvement of the Highlands—and hence the name which it assumed. But the great increase in the number of its Members since that time, the happy management of its funds, and the change in the general state of the country, have long enabled it to extend the design of its first institution, and direct attention to every part of North Britain where industry might be excited, or the useful arts improved.

The Society has, neither by its Charter of Incorporation, nor by its subsequent practice, been limited in its patronage to any one department of industry; but it has regarded, as the fitting objects of encouragement, every application of useful labour which might tend to the general good. But although its patronage be thus extended as regards its objects, circumstances have arisen to modify, in some cases, the application of it. The establishment of certain Boards, as for the encouragement of the Herring Fishery, and the like, has induced the Society to restrict its original views, and to devote its attention, and apply its funds, in a more especial manner to other objects, and chiefly to Agriculture and Rural Economy in their various branches.

In fulfilment of its purposes, the Society is every year accustomed to offer and award a variety of Premiums, as the means of eliciting and diffusing knowledge, as incitements to industry, or as the rewards for useful undertakings. These relate to every subject which may be supposed to fall within the plan of

the Institution :—such are, the Improvement of the Waste Lands of the co by Tillage, by Irrigation, or by Draining,—the extension of Plantations, objects of ultimate profit, or of present embellishment and shelter,—the im ment of the breeds of Live Stock, and of the qualities of Wool,—the enco ment of certain domestic Manufactures,—the invention of Useful Machi and, not the least in interest and importance, the awakening the Industry Lower Ranks to such pursuits as shall promote their content, by ameli their condition.

Although certain subjects be thus selected as the objects of experim discussion, the patronage of the Society is not restricted to these objects purposes being the promotion of general industry and improvement, it re with favour every beneficial communication, and every statement of facts, may admit of an useful application. A Mechanical Department exists f warding the original invention or subsequent improvement of all machin implements for Agricultural purposes, the construction of those for other bra of Rural Economy, and of some for domestic convenience. Models of the received and preserved; and it is proposed, that, for the future, descriptions as speedily as possible be conveyed to the Public of all such as may merit tion.

The papers of the Society are printed periodically in "THE QUART JOURNAL OF AGRICULTURE, AND THE PRIZE ESSAYS AND TRANSACTIO THE HIGHLAND SOCIETY OF SCOTLAND," published by Mr BLACKWO Edinburgh, Mr CADELL of London, and Messrs CURRY & Co. Dublin.

All Communications relating to Premiums, as well as Papers or Repo publication in the Transactions of the Society, and other subjects for the deration of the Directors, are to be addressed to CHARLES GORDON, Esq. D Secretary, at the Society's Hall, Albyn Place, Edinburgh.

NOTICE TO CANDIDATES,

AND GENERAL REGULATIONS OF COMPETITION.

When subjects are specially selected for competition, it is always to be understood, 1*st*, That however concisely the subjects themselves be announced, ample information is required concerning them; 2*d*, That this information shall be founded on experience or observation, and not on simple references and quotations from books; 3*d*, That it shall be digested as methodically as possible; and, 4*th*, That Drawings, Specimens, or Models, adapted to a defined scale, shall accompany Writings requiring them for illustration.

Certain conditions are annexed to each of the various subjects of competition, as detailed in the List of Premiums; and these are rigidly enforced by the Society, as the only means of ensuring regularity in the conduct of the business, and of distributing exact justice among the competitors.

In all Essays for competition, it is expected that when facts not generally known are stated, they are to be authenticated by proper references. Competitors in Essays shall not communicate their names, but shall transmit along with the Essays a sealed note containing their names and addresses, and inscribed on the back with some distinguishing motto or device, which shall also be inscribed on the Essay. When this regulation is neglected, such Essay shall not be received in competition. If the Essayist has formerly gained a Premium from the Society for a Paper communicated by him, it is recommended that his subsequent Essay shall be written in a different hand from that of the former successful Paper.

None of the sealed notes, except those which bear the distinguishing motto or device of the Essays found entitled to Premiums, will be opened, and the sealed note will not in any instance be opened, without the consent of the author, unless a Premium equal to at least one-half of the sum offered shall have been adjudged: But should no application be made for the Paper on or before the 1st of March in each year, it will be held as belonging to the Society on the terms proposed. Such Essays as are not found entitled to any Premium, shall, with the sealed notes, be returned to the authors, if required. The Society is to be at liberty to publish the Essays, or extracts from them, for which the Premium, or part of it, shall be awarded.

Candidates are requested to observe, that, in any instance, when Essays, Reports, or Certificates, are unsatisfactory, the Society is not bound to give the reward offered; and that in certain cases, power is reserved of giving such part only of a Premium as the claim may be adjudged to deserve; but competitors may feel assured that the Directors will always be inclined to judge liberally of their several claims.

In all Reports of Experiments relating to the Improvement or Management of Land, it is expected that the expenses shall be accurately detailed. When Machines or Models are transmitted, it must be stated whether they have been elsewhere exhibited or described.

In all Premiums offered, having reference to Weight or Measure, the New or Imperial Standards are alone to be understood as referred to; and should Competitors in any instance refer to other Weights or Measures, the exact proportion which these bear to the New Standards must be accurately specified, otherwise the claim will not be entertained.

When the Premiums are awarded in Plate, the Society will, in such cases as the Directors may see proper, allow them to be paid in money, on the application of the successful Candidates.

OFFICERS AND DIRECTORS, 1833.

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ACCORDING TO PRIORITY IN DATE OF ELECTION.

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PREMIUMS, &c.

Highland Society Hall,
Edinburgh, Feb. 11. 1833.

THE HIGHLAND SOCIETY OF SCOTLAND does hereby advertise, That the under-mentioned PREMIUMS are to be given by the Society in the year 1833, &c.

ESSAYS, PLANS, AND REPORTS.

1. RAISING AND MANAGING HEDGES.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best and approved Essay, founded on experience, on the manner of raising and managing Hedges, and on the kinds of Live Fence suited to differences of soil, climate, and modes of occupation.

Candidates are required to detail the manner of forming the mound, ditch, and other parts of the fence; the proper period of planting, the age of the plants, the kind of paling required, and the expenses of the work; detailing separately the expense of digging and planting, the price of the plants, the prime cost of wood for rails, and the expense of sawing and putting up the rails. They are also required to describe the subsequent management of the fence with respect to pruning, lopping, and weeding the plants, and cleaning the ditches, and the expense until it becomes an efficient fence.

Candidates are also required to state, in so far as their means of information have extended, the different kinds of plants adapted to live fences, and suited to differences of situation, soil, and climate; as the May-thorn, the Beech, the Hornbeam, the

Birch, the Holly, the Whin, &c. They are required to state the advantages and disadvantages of a mixture of plants, as the Beech with the Thorn, the Hazel with the Thorn, and the like; and to offer any suggestions which their experience may enable them to make, regarding the means of improving the state of the fences of the country.

Further, as many individuals, without being enabled to present an essay on the subject of fences, may have made useful and interesting experiments on particular species of plants for fences, it is proposed to award honorary premiums for useful information upon this subject. The writers are required particularly to state the circumstances of soil, altitude, and expense under which their experiments have been made, and the advantages which the plants cultivated seem to possess over those in common use, with respect to economy, to facility of rearing, hardiness, and endurance. Essays and communications to be lodged by the 20th October 1833, under the conditions on page 7.

2. PLANS OF COTTAGES.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best and approved Essay on the construction and disposition of dwellings for the labouring classes, calculated to combine, as far as possible, salubrity and convenience with economy.

The Essays to be accompanied with Designs and detailed Plans illustrative of the subject, and with Specifications and Estimates for single and combined cottages, on three different scales of accommodation and cost. The Essays, Plans, and Estimates, to be lodged by 20th October 1833, under the conditions on page 7.

NOTE.—The Plans of Cottages sent in competition for the premium offered last year, were in general on too expensive a scale, and were deficient in the arrangements necessary for the health and comfort of the inhabitants.

3. ECONOMIZING FUEL AND LIGHTING IN DWELLINGS OF THE LABOURING CLASSES.

The Gold Medal will be given for the best and approved Essay on the best mode of economizing Fuel, in dwellings of the labouring classes, by consuming the smoke or otherwise, and also of lighting such houses by a simple apparatus for making and supplying Gas. The Essays to be founded upon actual experience of a satisfactory nature, and to be lodged by 20th October 1833, under the conditions on page 7.

THE COMPARATIVE ADVANTAGES OF FEEDING LIVE STOCK ON RAW OR ON PREPARED FOOD.

1.) A Piece of Plate, of Thirty Sovereigns value, will be given the best and approved Report, founded on actual experiment, the comparative advantages of feeding Oxen or Heifers on food ı raw state, or in a boiled or steamed state.

The animals to be experimented upon shall not be fewer in number than six—three to be fed upon raw food, and three on food boiled or steamed. The food employed shall in both cases be of the same class and the same variety. If Swedish Turnips, for example, in their raw state, be given to the one set of animals, Swedish Turnips, and no other kind, must be given in a boiled or steamed state to the other; and the same food must be continued for the whole period. The animals must farther be of the same breed, and the same age and sex; and each may receive, during the progress of the experiment, a given quantity of hay or straw. The term of feeding shall not be less than three months; and the live weight of each animal, before and after the experiment, must be particularly specified.

2.) For the best Report, founded on actual experiment, on the ling of Swine on food in a raw state, or on food in a boiled or ımed state—the sum of Ten Sovereigns, or a Piece of Plate of t value.

The Swine to be experimented upon shall not be fewer than ten in number; five to be fed on each kind of food respectively. They must be of the same age and the same breed; and the food employed must, as in the case of the oxen, be of the same description and variety.

ılthough the experiment, if made on six Oxen or Heifers, and on ten ne, as above specified, will be held as complying with the conditions ıe premium, it will be regarded as satisfactory that a greater num- of animals be selected, and a variety of food employed.

'he competitors are further invited to communicate the result of observations they may have previously made on the relative adtages of the two modes of feeding, and to state the comparative exse attending each. Reports to be lodged by the 20th October 3, under the conditions on page 7.

5. FATTENED POULTRY.

The Gold Medal will be given for the best and approved Essay

on the means of improving the supply of fattened poultry for t markets of great towns.

The Essay must give an account of the practice which prevails the supply of the Paris, London, and Edinburgh markets r spectively, and be accompanied with designs, plans, and descri tions of any buildings or implements detailed or recommend in the work. The Essay to be lodged on or before 20th Oct ber 1833, under the conditions on page 7.

6. SEA-WEED AS A MANURE.

A Piece of Plate, of Ten Sovereigns value, will be given for t best and approved account, founded on experience, of the use sea-weed as a manure in its raw or unmanufactured state.

The reporter will be required to describe the different kinds sea-weed, either by their botanical names, or those by whi they are commonly known; the soils on which they should used, particularly those to which they are most applicable; t different kinds of crops raised, the quantity applied per ac the seasons when they should be put on the land, and its effec as compared with other manures. The reporter will also be r quired to describe any cheap process, by drying or compre sion, rendering the weed more portable, the expense of t process, and the utility of sea-weed as a manure in this sta compared with it before being dried or compressed. Repo to be lodged by 20th October 1833, under the conditions page 7.

7. KELP AS A MANURE.

A Piece of Plate, of Twenty Sovereigns value, will be giv for the best and approved Essay, founded upon experiment, gi ing a detailed practical account of a cheap and efficient mode rendering Kelp applicable to Agriculture as a Manure, either new process of manufacturing the weed, or by combining with some other cheap substance, either after the sea-weed formed into kelp, or during the process of manufacture. The e pense of the process, and of the substances used, to be stat The Essays to be lodged by 20th October 1833, under the co litions on page 7.

8. ACCOUNT OF THE QUARRIES IN SCOTLAND.

A piece of Plate, of Twenty-five Sovereigns value, will be gi

or the best account of the principal Quarries in Scotland, particularly those of Limestone (including marble) and Slate.

The statements of the writer must be made from his own personal experience, or derived from authentic sources of information, and the modes and expenses of working; the value of the saleable material raised; the quantities by weight or measure, with any other particulars relating to the public and private importance of such quarries; the means of disposing of their produce, and the improvements which may have been introduced in the modes of working them, must be detailed.

From those who may not have an opportunity of extending their inquiries to the general subject of quarries, as indicated above, accounts of individual sale-quarries will be received, and honorary medals awarded, if the communication shall be deemed of sufficient importance and interest.

Competitors are referred to the Prize Essays on Quarries, which were lodged with the Society in October 1832, the more important portions of which will be published in the Quarterly Journal of Agriculture, and Transactions of the Society, on the 1st of June next; and it is requested that the repetition of any of the details contained in these Essays may be as much as possible avoided, and that the attention of competitors be more particularly directed to such branches of the subject as do not appear to be sufficiently illustrated in the communications referred to. Reports to be lodged by the 20th October 1834, under the conditions on page 7.

9. FINE-WOOLLED SHEEP.

The Gold Medal or Ten Sovereigns will be given for the best and approved account of the Fine-woolled Breeds of Sheep on the Continent. Reports to be made by the 20th of October 1834, under the conditions on page 7.

A premium was awarded for a very good Essay lodged on this subject in 1832, but it is considered of too general a nature to be satisfactory. Reporters must describe accurately the best breeds of Fine-woolled Sheep,—their management throughout the whole year,—their food in winter,—the prevailing grasses of their summer pasture,—the weight and quality of their wool,—its ordinary or average price,—the mode of packing and sale,—and every other particular which may appear to be important. These details must be founded on authentic information, or personal observation.

10. PLANTS USED FOR DYING.

Twenty Sovereigns, or a piece of Plate of that value, will b given for the best and approved Essay on plants grown in Sco land, whether native or exotic, used or capable of being used i dying.

The Essay must contain a statement of the most favourable soil and situations for each plant, and the best mode of cultur the colour produced by each, and its durability; and dried sp cimens of the various plants described, are to be transmitte along with the Essay, which is to be lodged with the Secretar on or before the 20th October 1835, under the conditions s page 7.

11. EXTIRPATING FERNS FROM PASTURES.

Fifteen Sovereigns, or a piece of Plate of that value, will b given for the best and approved account, founded on experienc of a cheap mode of eradicating Ferns from Pastures, and particula ly from hill pastures, where the plough cannot be employed, an where it is not desirable to employ the fern for economical pu poses.

The extent of ground subjected to the experiment must not l less than twenty acres, the Report must state about what pr portion of the surface was occupied by the ferns, with the e pense per acre incurred in their eradication, and must be lodg with the Secretary, accompanied by specimens of the ferns d stroyed, on or before 20th October 1835, under the conditio on page 7.

There is evidence in favour of the belief, that repeated cutting the ferns while young and succulent, thus preventing th bringing their tops to perfection during a whole season, or t continuous years, will destroy them, and the application of s or wood ashes, has been suggested with the same view. It desirable that the truth of these opinions should be establish or refuted.

12. REPORTS ON DAIRY MANAGEMENT IN SCOTLAND.

To the person who shall, on or before the 20th of October ny year, transmit to the Society the best Report on the Mana ment of a Dairy, of not fewer than ten Cows, in any District Scotland—The Society's Silver Medal, or a Piece of Plate, as t Directors may see fit in the circumstances of the case.

The Report will detail the mode of management in the da

which forms the subject of the communication; the description of pasture, and general treatment of the cows; whether butter or cheese forms the staple produce: the process of manufacture, and how disposed of; if cheese, the kind or kinds made; description of the milk and cheese houses, and of the utensils; with any other circumstances that may appear material.

13. REPORTS ON IMPROVED RURAL ECONOMY ABROAD.

The Honorary Gold or Silver Medal of the Society will be given for the best accounts, founded on personal observation, of any useful practice or practices in rural or domestic economy adopted in other countries, which may seem fitted for being introduced with advantage into Great Britain.

For the most approved communication under this head, which shall be rendered on or before the 20th October in each year, the Society's Honorary Gold Medal will be awarded; and for all other communications in the same year, which shall be approved of, the Society's Honorary Silver Medal.

However advanced the state of the useful arts may be considered in this kingdom, it is not to be doubted that there are many practices in use, both of domestic and rural economy, in other countries, and particularly in France, the Low Countries, and the north of Germany, highly deserving of attention or imitation, and which yet are too apt to be disregarded or unnoticed by the traveller or casual resident. The purpose chiefly contemplated by the offer of the present premium, is to induce gentlemen who may visit other countries, to take notice of and record such particular practices as may seem calculated to benefit their own country, in the branches of the arts referred to; and it is proposed that the earliest opportunity shall, in all cases, be taken of communicating such details to the public.

14. HONORARY PREMIUM FOR AN ACCOUNT OF ANY DISTRICT IN SCOTLAND.

To the person who shall, on or before the 20th of October, in any year, furnish to the Society the best account of any district in Scotland, with reference to the present state of Husbandry and the progress of rural and general improvement—the Society's Silver Medal, or a Piece of Plate, as the Directors may see fit, in the circumstances of the case.

In describing the present state of husbandry in the district, th writer is required to advert to the general character of the soi and surface—to direct attention especially to the more recen improvements that have been made, or that may be in progress in the modes of tillage, the breeds of stock, the state and ma nagement of roads, the progress of plantations, and the like and generally to offer such suggestions as may admit of prac tical application, regarding the future improvement of the dis trict.

CONDITIONS OF COMPETITION.

The conditions of competition for Essays, Plans, and Reports, will b found under the "Notice to Candidates," prefixed to the List of Pre miums, page 7, and to which competitors are referred.

The essays, plans, and reports on subjects 1, 2, 3, 4, 5, 6 and 7, ar to be lodged at the Society's Hall, on or before the 20th of Octobe next 1833; those on subjects 8 and 9, by 20th October 1834; thos on subjects 10 and 11, by 20th October 1835, and reports on subjec 12, 13, and 14, by the 20th of October in any year.

EXPERIMENTS AND IMPROVEMENTS.

CLASS I.

WASTE LANDS.

1. HONORARY PREMIUMS FOR IMPROVEMENT OF A SPECIFIED EXTENT OF LAND BY TILLAGE.

1. To the Proprietor or Tenant in Scotland who shall, on o before the 10th of November in any year, transmit to the Socie a satisfactory report of his having, within the period of five yea mmediately preceding the date of his communication, successful mproved and brought into tillage, an extent of waste and hither ncultivated Land, not being less than one hundred acres—Th Gold Medal.

The Report may comprehend such general observations on t Improvement of Waste Land as the writer's experience ma have led him to make; but it is required to refer especially the land reclaimed (which, if not in one continuous tract, mu be in fields of considerable extent), to the nature of the s the previous state of the ground, the obstacles opposed to improvement, the mode of management adopted, the expen

and, in so far as can be ascertained, the produce and value of the subsequent crops; and the land must have borne one crop of grain, at least, previous to the year in which the report is made. The report must be accompanied by a certified measurement of the ground.

. To the Tenant in Scotland who shall, on or before the 10th November in any year, transmit to the Society a satisfactory port of his having, within the period of three years preceding date of his report, successfully improved and brought into til-e, an extent of waste and hitherto uncultivated Land, not being than thirty acres on the same farm—The Honorary Silver dal.

The honorary premium for this more limited extent is offered under the same conditions as that for No. I. of this class; but competitors will observe, that, having gained the Silver Medal, it shall not afterwards be competent to include the same improvement in a subsequent claim for the Gold Medal. Reports detailing particulars, as required in reference to the premium No. 1. of the class, accompanied by a certified measurement of the ground, to be transmitted to the Society before the 10th of November in any year.

. IMPROVEMENT OF LAND BY THE SETTLEMENT OF CROFTERS.

The Gold Medal will be given to the Proprietor who shall trans-to the Society the most satisfactory report of a system of im-ovement carried on upon his estate by settling crofters on waste d, and allotting to each a few acres of ground for improvement. ports to be transmitted by 20th October 1834.

The Society understands that considerable improvements have been effected in some parts of Scotland by establishing crofters with a few acres of land, on ground not previously in cultivation, and where, from the natural barrenness and expense of cultivation, no farmer of capital can be induced to settle; and it has been thought that the system might be advantageously adopted in many districts of the country similarly circumstanced, if the details were generally known. The report must be made as full as possible, in regard to situation, soil, roads, the expense of improvement, the length of lease, the encouragement given by the proprietor, the expense of the houses, and whether erected by the proprietor or by the crofters, the returns afforded by the ground after the improvement, and the increase of value, so far as can be ascertained.

CLASS II.

CROPS AND CULTURE.

1. NEW PLANTS ADAPTED TO FIELD CULTURE.

To any person who shall, on or before the 20th Octob any year, report to the Society any new species or variety o ful Plant, adapted to the ordinary field culture of Scotland- Silver Medal, or a Piece of Plate, as the Directors may see the circumstances of the case.

Satisfactory evidence will be required that the plant prod new in the cultivation of the country, either as regar species or variety, valuable as regards the uses to which be applied, and congenial to the soil and climate of Sco A particular detail of the discovery or circumstances whi to the experiment must be furnished, the mode of cultu scribed, and a specimen of the plant transmitted.

2. MANAGEMENT OF THE POTATO CROP.

The honorary Silver Medal, or a Piece of Plate, as the D tors may see fit, will be given for the best and approved ac of an experiment made to ascertain whether any, and how m advantage to the crop may be derived from plucking off P Blossoms. Reports to be lodged by 20th November 1833.

The variety or varieties of the potato must be stated, an period at which the blossoms were plucked off, or whether were in bud or fully expanded. The experiment must be formed on an extent of not less than two acres, the blo being plucked from alternate pairs of drills, and the fruit all to ripen on the others. The kind and quality of the soil be stated, and the amount of the crop ascertained by weig the respective drills, before the crop is removed from the The comparative quality, as well as weight, must be ascert and it will be desirable that this should be ascertained b quantity of flour yielded by 28 lb. of the clean tubers.

Along with the report of the experiment, bags properly la must be lodged, giving fair samples of the potatoes from which ripened their fruit, and of those from which the blo had been plucked.

3. VARIETIES OF THE POTATO FOR FIELD OR FARM CULTURE.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best and most satisfactory descriptive account, founded an actual experiment, of the different varieties of the Potato, best adapted for field culture. It is required that the report shall correctly detail the names and synonyms, the character of each kind as to its being prolific, early or late, oblong or round-shaped, waxy or mealy, red or white, liable to disease, or free from that tendency; the productiveness, both as regards general quantity per rood in imperial bushels, and quantity of flour from a given weight of the clean tubers, say 28 lb.; the mode of preparing the sets, planting, and earthing up; also the keeping properties of the different varieties, so far as the writer's experience enables him to afford information on their qualities for keeping, and such other points as may appear material.

It is to be understood that all kinds of Potatoes raised in the field are included, whether for domestic use, as the Early Champion, Breadfruit, Rednose Kidney, &c. or for feeding stock, as the Yam, Oxnoble, &c. Competitors may adopt such mode of culture, quantity and quality of manure, distance of the sets and rows, period of planting, and the like, as may seem best; but evidence will be required that all the varieties brought into competition with each other shall have been raised in similar circumstances as regards soil, manure, and general culture, and that they have been grown in the same season. The quantity of each variety raised by the Competitor must be certified by two members of the Society, or by the affidavit of the Competitor, to have been not less than four bushels.

Reports, accompanied by a sample of one-fourth of a bushel of each kind of the potatoes, in bags correctly labelled, must be lodged with the Secretary, at the Society's Hall, on or before the 1st December 1834.

4. VARIETIES OF THE POTATO FOR GARDEN CULTURE.

Ten Sovereigns, or a piece of Plate of that value, will be given for the best and most satisfactory descriptive account, founded on actual experiment, of the different varieties of the Potato best adapted for Garden culture. The report to detail correctly the names and synonyms, and the description of the qualities, and keeping properties, as required in reference to field potatoes.

The kind of manure employed, the quality of the soil, the di between the sets and rows, the relative size of the leave their inclination to stand upright or to droop, the tendency t duce flowers or the absence of that tendency, the liability t or the freedom from that disease, to be severally mentioned.

Reports, accompanied by Certificates of two Members c Society, or by the affidavit of the Competitor, that at le bushel of each sort have been raised by him under similar ci stances, and in the same season, and by one-fourth of a bus each sort, in bags properly labelled, to be lodged with t cretary at the Society's Hall, on or before the 1st of Dec 1834.

5. FEEDING OFF TURNIPS BY SHEEP.

The Society being of opinion that the practice of feedi turnips on the ground, by sheep, may be advantageously duced into those districts of Scotland which are suited to i where it has not yet been generally adopted, offers the foll Premiums in the districts after mentioned.

1. *The Stewartry of Kirkcudbright.*
2. *The Eastern District of Ross-shire.*
3. *The County of Ayr.*
4. *The County of Sutherland.*

To the farmer in the first district, who, in the year shall have cultivated, in drill, the greatest extent of turnip being under ten acres, in proportion to the extent of his under a regular system of rotation, and of which at least on shall be eaten off on the ground by the feeding of sheep, ca and regularly inclosed with hurdles or nets, and upon lan adapted to the purpose—Ten Sovereigns.

To the farmer in the said district, who shall have cultivate ed off the next greatest extent, as aforesaid, not being les four acres—Five Sovereigns.

To the farmer in each of the second, third and fourth dis who shall, in the year 1833, cultivate the greatest extent of nips, in drill, estimated as aforesaid, not being under ten and of which at least one-half shall be eaten off on the grou manner before specified—Ten Sovereigns.

To the farmer in each of the second, third, and fourth Dis

who shall cultivate and feed off the next greatest extent, not less than four acres—Five Sovereigns.

In any portion of the field, reserved to be fed off by sheep, the blanks left by the turnips removed shall not exceed five drills, so as the benefit of this mode of feeding, arising from the treading and manure of the stock so fed, may be distributed over the whole of such portion.

Competitors for the Premiums in the First District will transmit to the Secretary of the Society, on or before 10th November 1833, an affidavit, specifying the extent of their Farms, under a regular system of rotation, the extent under turnips in 1832, the kind or kinds raised, the proportion fed off by sheep, the manner in which it was done, and within what period; description of sheep so fed, and whether they were the claimants' own stock, or were sent for feeding by another; and, in the last case, the price obtained per acre will be stated. The affidavit to be accompanied by a certificate of two members of this Society, in support of the matters therein detailed.

The like certificates for the 2d, 3d, and 4th Districts to be transmitted by 10th November 1834.

6. PLOUGHING COMPETITIONS.

Premiums to ploughmen for improvement in ploughing having for some years been given very generally over the country by the resident gentlemen, and local Agricultural Societies, the Highland Society has, in the mean time, discontinued them; but being desirous of encouraging improvement in this branch of husbandry, the Society will give its Silver Plough Medal to the ploughman found to be the best at such competition, provided not fewer than fifteen ploughs shall have started. The Medal will be issued upon a report from one or more Members of the Society, who shall have actually attended the competition, stating the number of ploughs that had started, and that the ploughman found to be the best had not received the Society's Medal at a previous competition in the same district.

The Reports must be lodged with the Secretary, at the Society's Hall, within three months after the competition, otherwise the Medal will not be issued.

CLASS III.

PASTURES.

1. LAYING DOWN LANDS TO PERMANENT PASTURE.

The Gold Medal, or a Piece of Plate, will be given to the P prietor or Tenant in Scotland, who shall, on or before the 10th November, in any year, report to the Society the most succes experiment in the laying down of land to permanent pasture, eit wholly with the indigenous grasses, or with a mixture of th grasses and clover, or other plants adapted for herbage.

The land which has formed the subject of experiment must ha been pastured for at least one season, exclusive of that in whi the report is given in; the extent of the ground must not ha been less than ten acres; and a certified account must be tra mitted of the kinds and quantity of the grass seeds sown.

In offering this Premium, the Society does not express any o nion regarding the expediency of keeping land in a state permanent grass, rather than in a course of alternate till nor regarding the supposed superiority of several of the nat grasses for the purpose of pasture, over the artificial grasses long and beneficially employed in Scottish agriculture. T Society merely proposes to obtain information and promote periment, and to direct attention to a branch of rural econo supposed to have been hitherto less attended to, and less s cessfully practised in Scotland, than the alternate husbandry.

The reporter, while he is required to state the results of this periment to which his own report refers, is invited to comm nicate such farther information as his experience enables h to give, regarding the general management of land in a state perennial pasturage, the m ans which may be employed maintaining or increasing the productiveness of the herbage top-dressing or otherwise, and the modes which have b found most successful in practice for destroying moss other injurious plants in the sward.

2. COMPARATIVE ADVANTAGES OF LAYING DOWN LANDS TO P TURE, WITH AND WITHOUT A WHITE CROP.

There being reason to believe that the sacrifice of a white cr ... laying down lands to pasture, will, under many circumstan

be counterbalanced by the superior produce of grass, the Society is induced to offer the following premium :—

A Piece of Plate, of Twenty Sovereigns value, will be given for the best and approved comparative report, founded upon actual experience in Scotland, of land laid down to pasture with the indigenous grasses adapted to the particular soil, without any white crop along with the grass seeds; and of land in similar circumstances of soil, climate, and condition, sown down with the same grasses along with a white crop.

The extent of land laid down without a white crop shall not be less than seven acres, and the same quantity to be laid out with a white crop. A particular account is required of the preparation of the land for the seed, the quantity and quality of the manure applied, the kinds and quantities of the grass-seeds, and the kind of grain sown, and the probable value of the same; with a distinct account of the kind and number of the stock pastured upon each field, and their comparative progress in condition for two, three, or more successive seasons; with such observations as may suggest themselves, calculated to settle the question. A hay crop is excluded. Reports to be lodged by November 1834.

3. SAVING THE SEEDS OF NATURAL GRASSES.

The demand for the Seeds of Natural Grasses having much increased, and the Society being satisfied that these seeds may be advantageously saved in Scotland, offer the following premiums :—

Ten Sovereigns, or a Piece of Plate of that value, will be given to the person in Scotland who shall save the largest quantity and the best quality of the greatest number, or of all the following grasses, viz.—

Alopecurus pratensis.	Dactylis glomerata.
Festuca pratensis.	Phleum pratense.
Poa trivialis.	

To the person who shall save the second largest quantity, and best quality, Five Sovereigns.

Reports detailing the mode adopted, and accompanied by satisfactory evidence, that the quantity saved of any of the above seeds has not been less than twenty bushels, and also with samples of the seeds saved, must be lodged with the Secretary, at the Society's Hall, on or before the 1st of November 1834.

NOTE.—The Seedsman to the Society will give the highest wholesale

prices to the successful Candidates, to the extent of one hundred bushels of each sort raised as above; and he will treat with Competitors generally for their produce.

4. COLLECTING THE SEEDS OF NATIVE LEGUMINOUS PLANTS.

Eight Sovereigns, or a Piece of Plate of that value, will be given to the person who shall collect and afterwards raise, the greatest number of kinds of the following native leguminous plants, viz.

Vicia Sepium,	or	Bush Vetch.
..... Cracca,		Tufted Vetch.
..... sylvatica,		Wood Vetch.
Lathyrus pratensis,		Yellow Meadow Vetchling.
Lotus major,		Great bird's-foot Trefoil.

To the person who shall collect and afterwards raise the second greatest number—Four Sovereigns.

Reports, detailing the mode in which the seeds were collected, and subsequently raised, accompanied by satisfactory evidence that the quantity so raised has not been less than Ten Bushels of each kind, and also with samples, must be lodged with the Secretary at the Society's Hall, on or before 1st November 1835.

NOTE.—The Society's Seedsman will give a fair price for the quantity raised by Competitors for the Premium.

CLASS IV.

LIVE STOCK—DISTRICT COMPETITIONS.

§ I. CATTLE.

PREMIUMS FOR IMPROVING THE BREED OF CATTLE IN THE FOLLOWING DISTRICTS:—

1. *Wigtonshire.*
2. *The Districts of Mid and Nether Lorne, in the county of Argyll, comprehending the parishes of Ardchattan and Muckairn; that part of the parishes of Inishail and Kilchrenan lying north of Loch-Awe; the parishes of Kilmore and Kilbride; the parish of Kilninver; that part of the parish of Kilmelfort, lying within the district of Lorne; and the parishes of Kilbrandon and Kilchattan.*
3. *The following parishes in the counties of Stirling, Dumbarton,*

and Perth, viz. Drymen, Buchanan, Balfron, Gargunnock, St Ninian's, Kippen, Baldernock, Killearn, Strathblane, Fintry, Kilmaronock, East and West Kilpatrick; that part of Bonhill to the east of the Leven, Dumbarton, Aberfoyle, and Port.

4. *The District of Kincardineshire, comprehending the parishes of Fettercairn, Fordoun, Marykirk, Garvock, Laurencekirk, Arbuthnott, Glenbervie, and that part of the parish of Edzell in Kincardineshire.*
5. *The District of Aberdeenshire, comprehending the parishes of Strathdon, Glenbucket, Cabrach, Towie, Tarland, Migvie, and Logie-Coldstone; those parts of the parishes of Coul and Tulloch in Cromar; those parts of the parishes of Glenmuick, Glengairn, and Tullich, and of Crathie, which are on Gardenside and in Morven.*
6. *The District of Buchan, in Aberdeenshire, from the River Ythan on the south, to the River Doveran on the north and west, including also the adjoining parishes of Logie-Buchan, Foveran, and Methlick, in the District of Formartin.*
7. *The West Teviotdale District in the counties of Roxburgh and Selkirk, comprehending the parishes of Hobkirk, Kirkton, Cavers, Hawick, Roberton, Wilton, Southdean, Minto, and Lilliesleaf.*
8. *Kinross-shire.*
9. *Dumbartonshire District, comprehending the county of Dumbarton, excepting the parishes of Cumbernauld and Kirkintulloch, and including that part of the county of Renfrew situated north of the River Clyde, and also that part of the parish of East Kilpatrick, in Stirlingshire.*
10. *The parishes of Greenock, Port-Glasgow, Kilmalcolm, Largs, and Innerkip, in the counties of Renfrew and Ayr.*
11. *The Island of Mull, Argyllshire, including the Islands of Coll, Tyree, Ulva, Icolmkill, and other small isles adjacent.*
12. *The District in the west of Perthshire, comprehending the parishes of Callander, Kilmadock, Kincardine, Comrie, and Balquhidder, with that part of the District of Breadalbane comprising Glenlochy, Glendochard, and Glenfalloch.*
13. *The Huntly District, comprehending the parishes in the Counties of Aberdeen and Banff, described in the List of Premiums for* 1832.
14. *Clackmannanshire, including the parishes of Culross, Fossaway,*

Tulliallan, Muckhart, Logie, and Glendevon, in the county of Perth; and Alva in Stirlingshire.

15. *The Islands of Islay, Jura, and Colonsay, in the county of Argyll.*
16. *The District of Argyll, Argyllshire.*
17. *The District of Braemar, Aberdeenshire.*

For the best Bull, from two to seven years old, *bona fide* the property, and in possession, of any proprietor or tenant in *each* of the ten Districts, Nos. 1, 3, 4, 5, 6, 7, 8, 10, 13, and 14, as above described, kept on his farm within the District, from the 20th day of May preceding the day of competition—Ten Sovereigns.

For the second best Bull, of the age above specified, *bona fide* the property, and in possession, of any proprietor or tenant in *each* of the said ten Districts, and kept on his farm, within the District, for the aforesaid period—Five Sovereigns.

For the best two Queys, of two years old, the property of, and bred by, any tenant in *each* of the ten Districts above-mentioned (Kinross, No. 8., excepted)—Five Sovereigns.

For the second best two Queys, of two years old, the property of, and bred by, any tenant in each of the ten Districts above mentioned (Kinross, No. 8., excepted)—Three Sovereigns.

For the best two Queys, of two years old, the property of, and bred by, any tenant, or by any proprietor of land under L. 300 of yearly rent or value, in the Kinross district, No. 8.—Five Sovereigns.

For the second best two Queys, of two years old, the property of, and bred by, any tenant, or by any proprietor, as aforesaid, in Kinross-shire—Three Sovereigns.

For the best Bull of the age above specified, exhibited at the competition in each of the Districts Nos. 2, 9, 11, 12, 15, 16, and 17, if *bona fide* the property of a proprietor, or of a factor named on the Committee, or acting in the absence of his constituent, and kept in his possession for the foresaid period—The Honorary Silver Medal.

For the best Bull from two to seven years old, *bona fide* the property and in possession of any tenant, in each of the said seven Districts Nos. 2, 9, 11, 12, 15, 16, and 17, kept on his farm within the District, from the 20th day of May preceding the competition—Ten Sovereigns.

For the second best Bull, of the same age, in each of the said seven last mentioned districts, the property and in possession of any tenant, and kept on his farm within the District, for the foresaid period—Five Sovereigns.

For the best two Queys, of three years old, the property of, and bred by, any tenant in *each* of the seven last-mentioned Districts, Nos. 2, 9, 11, 12, 15, 16, and 17—Five Sovereigns.

For the second best two Queys, of three years old, the property of, and bred by, any tenant in each of the said seven Districts last above-mentioned—Three Sovereigns.

The competition in the Districts Nos. 1. to 12., both inclusive, will take place in 1833; and in Nos. 13, 14, 15, 16, and 17, in 1834.

The following Members of the Society, (as Members only, or their Factors in their absence, can be named) are hereby appointed Committees for regulating all details, and judging at the competitions for the twelve districts first above-mentioned. In the Districts Nos. 13. and 14, the Committees were named in the advertisement of 1832; and the Committees for the Districts Nos. 15, 16, and 17, will be intimated in that of 1834.

For the First District.—The Earl of Galloway; Lord Viscount Gairlies; Sir Wm. Maxwell, Bart.; Sir James Dalrymple Hay, Bart.; Sir David Maxwell, Bart.; Sir Andrew Agnew, Bart. M. P.; James Blair, Esq. of Penningham; John Adair, Esq. of Genoch; Colonel Vans Agnew of Sheuchan; Forbes Hunter Blair, Esq. of Dunskey; Nicol Brown, Esq. of Waterhaughs; Edward Boyd, Esq. of Mertonhall; John Cathcart, Esq. of Genoch; William Hamilton, Esq. of Craichlaw; Hugh Hathorn, Esq. of Castlewig; Vans Hathorn, Esq. of Garthland; Col. Macdouall of Logan; Lieutenant-Colonel Macdouall, C. B.; James Carrick Moore, Esq. of Corswell; Stair Stewart, Esq. of Physgill; Alexander Macneill, Esq. Stranraer; Alexander Macdonell, Esq. Sheriff-Substitute; and any other Members in the District; five to be a quorum. Mr Cathcart of Genoch, Convener.

For the Second District.—The Marquis of Breadalbane; the Earl of Ormelie; Lord John Campbell; Sir Duncan Campbell of Barcaldine, Bart.; General Campbell of Lochnell; Alexander Campbell, Esq. of Monzie; Robert Campbell, Esq. of Ardchattan; Charles Campbell, Esq. of Combie; Donald Campbell, Esq. of Dunstaffnage; Robert Campbell, Esq. of Sonachan; Colin Campbell, Esq. of Ballyveolan; James Archibald Campbell, Esq. of Inverawe; Cap-

tain Macdougall of Macdougall, R. N.; Dugald Macdougall, Esq. of Gallinich; Keith M. Macalister, Esq. of Inistreynish; Allan Macdougall, Esq. W. S.; and any other Members in the District; five a quorum. Lochnell, in his absence, Mr Macdougall of Gallinich, Convener.

For the Third District.—The Duke of Montrose; the Marquis of Graham; Lord Montagu William Graham; Sir Archibald Campbell, Bart.; R. C. Bontine, Esq. of Ardoch; John Cross Buchanan, Esq. of Auchintoshan; John Buchanan, Esq. of Carbeath; John Buchanan, Esq. of Ardoch; John Buchanan, Esq. younger of Ardoch; P. Buchanan, Esq. of Auchmar; J. C. Colquhoun, Esq. of Killermont, M. P.; Samuel Cooper, Esq. of Ballindalloch; James Dennistoun, Esq. of Dennistoun; J. Dennistoun, Esq. younger of Dennistoun; J. M. Gartshore, Esq. of Gartshore; W. Dunn, Esq. of Kilbowie; W. C. C. Graham, Esq. of Gartmore; John Graham, Esq. younger of Ballagan; General Graham Stirling, of Duchray; J. R. Smollett, Esq. of Bonhill; George Buchanan, Esq. of Finnich-Malise; John Buchanan, Esq. at Finnich; R. Macgowa, Esq. of Mains; John MacAdam, Esq. of Blairover; John MacInnes, Esq. of Auchinfroe and Woodburn; Stewart Jolly, Esq.; and any other Members in the District: five a quorum. The Duke of Montrose, in his absence his Grace's Factor, Convener.

For the Fourth District.—The Earl of Kintore; Viscount Arbuthnot; General the Honourable H. Arbuthnot, M.P.; Sir Alexander Ramsay, of Balmain, Bart.; Captain Thomas Ramsay; Thomas Burnett, Esq. younger of Leys; R. Barclay Allardice, Esq. of Ury; General Burnett, of Banchory-Lodge; R. W. Duff, Esq. of Fetteresso; R. Duff, Esq. younger of Fetteresso; Arthur Duff, Esq. of Cocklaw; George Douglas, Esq. Sheriff of the County; George Robertson Scott, Esq. of Benholm; James Scott, Esq. of Brotherton; Major-General Straton, of Kirkside; William Shand, Esq. of Arnhall; Henry Lumsden, Esq. of Tilwhilly; William Stewart, Esq. Sheriff-Clerk of the County; George Robertson, Esq. Factor on the Estate of Brucklay, &c.; and any other Members in the District: three a quorum. Lord Arbuthnot, Convener.

For the Fifth District.—The Duke of Gordon; the Earl of Aboyne; the Earl of Fife; Sir Charles Forbes, Bart.; Colonel Sir Alexander Leith, of Freefield; John Forbes, Esq. M.P.; Charles Forbes, Esq. of Asloun; George Forbes, Esq. of Auchmithil; Major-General Forbes of Auchernach; Major Anderson of Candacraig; James Farquharson, Esq. of Invercauld; Archibald Farquharson, Esq. of Finzean; the Rev. Dr Forbes of Bleilack; Charles Gordon, Esq. of Wardhouse; J. D. Gordon, Esq. younger of Wardhouse; Michael Gordon, Esq. of Abergeldie; H. Leith Lumsden, Esq. of

Auchindoir; Benjamin Lumsden, Esq. of Kingsford; John Roy, Esq. Factor on the Estate of Invercauld; Mr Grassick, Glenbucket; Mr Stewart, Balletrach; Mr Grassick, Bucham; Mr Robertson, Crathie; and any other Members in the District: four a quorum. John Forbes, Esq. M.P.; in his absence Dr Forbes of Blelack, Convener.

For the Sixth District.—The Earl of Aberdeen; Lord Saltoun; The Right Honourable Sir Robert Gordon, G. C. B.; Captain the Honourable W. Gordon, M. P.; Sir John Stuart Forbes, Bart.; Sir Charles Forbes, Bart.; John Forbes, Esq. M. P.; Charles Forbes, Esq. of Asloun; George Forbes, Esq. of Auchnagathil; George Ferguson, Esq. of Pitfour; Michie Forbes, Esq. of Crimmond; Colonel Gordon of Cluny; T. A. Fraser, Esq. of Lovat and Strichen; Garden Duff, Esq. of Hatton; James Ferguson, Esq. of Kinmundy; John Gordon, Esq. of Cairnbulg; Thomas Gordon, Esq. of Buthlaw; Charles Gordon, Esq. younger of Auchluchries; Alexander Forbes Irvine, Esq. of Chivas; J. W. Mackenzie, Esq. of Pitrichie; John Turner, Esq. of Turnerhall; Charles Bannerman, Esq. of Crimonmogate; Robert Hutchison, Esq. younger of Cairngall; Thomas Arbuthnot, Esq. of Meethall; Roderick Gray, Esq. Peterhead; and any other Members in the District; five a quorum.—Lord Saltoun, in his absence Mr Ferguson of Kinmundy, Convener.

For the Seventh District.—His Grace the Duke of Buccleuch; the Earl of Minto; Lord John Scott; Sir Edmund Antrobus, Bart.; Sir William Scott of Ancrum, Bart; Sir W. F. Elliott of Stobs and Wells, Bart.; Allan Elliot Lockhart, Esq. of Cleghorn; James Johnstone, Esq. Alva; John C. Scott, Esq. of Sinton; James Elliot, Esq. of Wolflie; Lieutenant-Colonel James Fergusson of Huntlyburn; George Cleghorn, Esq. of Weens; Archibald Dickson, Esq. of Huntlaw; Archibald Jerdan, Esq. of Bonjedward; John Robertson, Esq. Ednam House; H. F. Scott, Esq. younger of Harden, M. P.; Mark Sprott, Esq. of Riddell; Charles B. Scott, Esq. of Woll; Thomas Stavert, Esq. of Hosecoat; Archibald Douglas, Esq. of Adderstone; Major Oliver of Bush; J. A. Ormiston, Esq. of Glenburnhall; John Paton Esq. of Crailing; and any other Members in the District; three a quorum.—The Duke of Buccleuch, in his Grace's absence Mr Elliot of Wolflie, to be Convener.

For the Eighth District.—The Lord Chief-Commissioner; Lord Moncrieff; Admiral Adam; Thomas Bruce, Esq. of Arnot; Thomas Beatson, Esq. of Mawhill; the Rev. George Craig Buchanan of Mackeanston; John Wright Williamson, Esq.; John Young, Esq. of Cleish; and any other Members in the District: two a quorum.—Admiral Adam, Convener.

For the Ninth District.—The Duke of Montrose; the Marquis of

Graham; Lord Montague W. Graham; Lord John Campbell; Sir James Colquhoun, Bart.; Sir Archibald Campbell of Succoth, Bart.; R. C. Bontine, Esq. of Ardoch; John Buchanan, Esq. of Ardoch; John Buchanan, Esq. younger of do.; John Cross Buchanan, of Auchentoshan; J. C. Colquhoun, Esq. of Killermont, M. P.; William Dunn, Esq. of Duntochar; James Colquhoun, Esq. younger of Luss; J. C. Colquhoun, Esq. Sheriff of the County; James Dennistoun, Esq. of Dennistoun; James Dennistoun, Esq. younger of Dennistoun; Alexander Dunlop, Esq. advocate; John Horrocks, Esq. of Tillychewen Castle; James Hamilton, Esq. younger of Barns; Stewart Jollie, Esq.; J. R. Smollett, Esq. of Bonhill; Alexander Smollett, Esq. younger of Bonhill; James Smith, Esq. of Jordanhill; Gibson Stott, Esq. of Balloch Castle.—Sir James Colquhoun, in his absence Mr Smollett, younger of Bonhill, Convener.

For the Tenth District.—The Earl of Glasgow; Lieutenant-General Sir Thomas M. Brisbane, Bart.; Sir Michael Shaw Stewart, Bart. M. P.; Lieutenant-General Darrock, of Gourock; J. C. Dunlop, Esq. Sheriff of Renfrewshire; R. Wallace, Esq. of Kelly, M. P.; R. Cunninghame Bontine, Esq. of Ardoch; James Hunter, Esq. of Hafton; James Hunter, Esq. younger of do.; Claud Marshall, Esq. Sheriff-Substitute of Greenock; John Campbell, Esq. of Craignure; William MacFie, Esq. of Langhouse; John Scott, Esq. of Hawkhill; John Scott, Esq. younger of do.; Roger Ayton, Esq. banker, Greenock; W. Macknight Crawford, Esq. of Cartsburn; Alexander Thomson, Esq. and J. H. Robertson, Esq. bankers, Greenock; James Watt, Esq. of Crawfordsdyke; James Stuart, Esq.; William Johnstone, Esq.; Robert Ewing, Esq.; Robert Sinclair, Esq.; James Mure, Esq.; Andrew Mure, Esq.; John Farrie, Esq.; James Leitch, Esq.; John Maclellan, Esq.; Maitland Young, Esq.; Charles Scott, Esq.; Adam Macleish, Esq.; John Gray, Esq. all merchants in Greenock; William Turner, Esq. surgeon, Greenock; Matthew Brown, Esq. Port-Glasgow; and any other members in the district; five a quorum.—Mr Wallace of Kelly, in his absence Mr Marshall, to be Convener.

For the Eleventh District.—Colonel Maclean of Coll; Hugh Maclean, Esq. younger of Coll; Lieutenant-Colonel Campbell, of Knock; Lieutenant-Colonel Campbell, of Possil; John Gregorson, Esq. of Ardtornish; Lieutenant-Colonel Robert Macdonald of Inchkenneth; Lieutenant-Colonel Macquarrie, of Ulva; Murdoch Maclaine, Esq. of Lochbuy; Donald Maclean, Esq. of Boreray; John Maclean, Esq. of Killundin; John Stewart, Esq. of Auchadashinaig; Donald Maclean, Esq. W. S.; James Maxwell, Esq.; and any other members in the district; three a quorum.—Colonel Campbell, of Possil, to be Convener.

'OR THE TWELFTH DISTRICT.—The Marquis of Breadalbane; the Earl of Moray; the Earl of Ormelie; Lord Willoughby de Eresby; Sir Evan Macgregor, Bart.; Sir Robert Dundas, Bart.; Alexander Buchanan, Esq. of Arnprior; R. Cunningham Bontine, Esq. of Ardoch; H. Home Drummond, Esq.; David Dundas, Esq. younger of Dunira; General Graham Stirling, of Duchray and Achyle; J. A. M. Macgregor, Esq. younger of Macgregor; James Graham, Esq. of Leichtown; John Burn Murdoch, Esq. of Coldoch; William Stewart, Esq. of Ardvorlich; Robert Stewart, Esq. younger of do.; John L. Stewart, Esq. of Glenbuckie; Donald Macdonald, Esq. of Craigruie; and any other members in the district; three a quorum. —Gen. Graham Stirling, in his absence Mr Stewart, younger of Ardvorlich, to be Convener.

OR THE THIRTEENTH AND FOURTEENTH DISTRICTS.—The Judges and Conveners remain as intimated last year, with the addition of those resident Members who have been since elected.

OR THE FIFTEENTH DISTRICT.—Walter F. Campbell, Esq. of Islay, in his absence James Campbell, Esq. younger of Jura, to be Convener.

OR THE SIXTEENTH DISTRICT.—Sir John Poulett Orde, Bart. to be Convener.

OR THE SEVENTEENTH DISTRICT.—James Farquharson, Esq. of Invercauld, in his absence his Factor, to be Convener.

The Committees in the three last mentioned Districts will be intimated in the advertisement of 1834.

RULES OF COMPETITION.

1. The Conveners, with the approbation of a quorum of the Committee for nducting the several competitions, are respectively authorized, in such cases as ey shall see proper, to divide the two premiums allowed for Bulls into three emiums, in such proportions as they shall approve, the first premium for bulls t being less than Eight Sovereigns; and, in like manner, to divide the sums alved for Queys into three premiums, fixing their amount.

2. The Committee shall not place for competition any stock which, in their inion, does not fall within the regulations prescribed, or does not possess merit, l in no instance shall any of the money premiums be awarded, where there not, after such selection, at least three competitors, reserving to the Committ, in the case here provided for, to make such allowance to a party showing ck of merit, not exceeding half the amount of the premium, as, under the cirnstances, they may think reasonable.

3. The times and also the places of competition are to be fixed by the Conves, with the advice of at least a quorum of their respective Committees, and competitions are to take place between the 1st of June and the 1st day of Nonber next.

4. The Convener of each Committee will give timely notice to the other Mems of the Committee, of the place and time of the competition, and will be parlarly careful that the same be intimated at the several parish church doors

within the district for at least two successive Sundays previous to the competition.

5. As these premiums were given, in some of the above-mentioned districts, in 1828, 1829, 1830, and also in 1831, it is to be observed that the Society does not admit an animal, in any class of stock, which may have gained the Society's first premium at a District or General Show, in a former year, to be again shown in competition in any district; and for no description of stock shall either the same or a lower denomination of premium be awarded, in the district in which they have already gained a premium. In those districts where the honorary Silver Medal is offered for bulls, tenants cannot compete, with the same animal, both for the honorary and the money premiums.

6. No Member of the Committee, showing stock of his own at the competition, shall act as Judge, nor shall Factors, when they are Members of the Society, and are named on the Committee, or when acting in the absence of proprietors, compete for the money premiums in the district, in which they are so named or act, in those districts and classes in which proprietors are excluded from competition. In all cases, the bulls, for which the money premiums are awarded, must have served, or shall be kept to serve, the district, for at least one season, at a moderate charge for each cow, and the rate may be fixed by the Committee. The same person is not to obtain more than one of the premiums for bulls, nor more than one of the premiums for queys, in one year, except in those districts where tenants compete for the honorary and money premiums for bulls, in which case they may, with different animals, carry the medal and one of the money premiums. While the Directors have deemed it expedient to exclude Proprietors, and Factors named on the Committee, or acting in the absence of Proprietors, from competing for the *money premiums* in certain districts, where it is apprehended that the superiority of their stock might discourage competition on the part of the tenantry, they are fully impressed with the advantages of having such stock exhibited at the District Shows, and have offered the Honorary Silver Medal of the Society for the best Bull exhibited at the competition, should he be the property of one in that class, and superior to the bull to which the highest money premium is awarded.

7. In order to entitle the competitors to their respective premiums, a regular report, signed by the Convener, and at least a majority of the Committee who attend the competition, must be transmitted by the Conveners, so as to be received by the Secretary on or before the 10th of December next, and which report must specify the ages of the bulls and queys preferred; the length of time the bulls have been in the possession of the competitors, and, with respect to the queys, that they were bred by the competitors, and were their property on the day of competition; the number of bulls and queys respectively produced thereat; the number placed for competition in each class; the names and designations of the persons to whom the premiums have been adjudged; amount of premium voted to each; and, in general, that all the rules of competition fixed by the Society, as above mentioned, have been strictly observed; and, in particular, that the previous intimations to the Committee of Judges and advertisements at the church doors, were regularly made as required. In case all the Members of the Committee who may have attended shall not have subscribed the report, the Convener will mention the cause which may have prevented their doing so.

Further, it is to be distinctly understood, that in no instance does any claim lie against the Society for expenses attending a show of stock, beyond the amount of the premiums offered.

With reference to the competitions in the 2d, 11th, 15th, and 16th districts, the reports must bear, that the bulls and queys preferred were of the Ayr

Highland breed; in the 1st, of the Galloway breed; in the 10th, of the Ayrshire Dairy; and in the 7th, that the bulls were of the pure short-horned breed.—*N. B.* Upon application of the Lorne and other Highland Districts, the age of the queys in these districts has been changed from two to three years; but as this is the last year of the Competition in the 2d or Lorne district, and the change might disappoint some intending Competitors, the Directors have fixed that the queys in that district may be shown either at two or at three years old, the Judges being required, in forming their opinion, to take difference of age into their especial consideration.

Conveners are requested to get the reports drawn up and signed by a majority of the Committee present at the competition, before they separate.

NOTE.—The Society, being impressed with the benefit to be derived from continuing these competitions in the same districts for a longer period than had formerly been the practice, proposes again to offer them in the districts Nos. 10, 11, 12 (in which 1831 was the first year's competition of the series), for the year 1835, and, provided the gentlemen of the district, or any local association therein, shall have continued the competition and have awarded premiums in the district, to the amount of not less than one-half of the Society's premiums, and for the same description of stock, during the intermediate years 1832 and 1834, the Society will continue its premiums to the districts in the year 1836. The same provisional continuance for the year 1833 was intimated in 1828, with reference to the districts Nos. 1, 2, 3, 4, 5, 6, and 14, in which 1828 was the first year of competition, and the premiums are accordingly this year given in these districts, with the exception of No. 14, in which, by request of the district, they are postponed till 1834; a similar intimation of provisional continuance for 1834 was made in 1829 for the districts Nos. 7, 8, and 9, in which 1829 was the first year of competition; and the like provisional continuance for 1835 was made for No. 13, in which 1830 was the first year of competition. A certificate of the competition and premiums awarded at the two intermediate local shows, signed by at least two Members of the Society, must be transmitted to the Secretary of the Society, so as to be received by him on or before the 10th December in each year, in order to entitle the districts to any claim for the additional year's premiums.

§ II. SHEEP AND WOOL.

1. PREMIUMS FOR IMPROVING THE BREED OF SHEEP IN THE FOLLOWING DISTRICTS.

The Parishes of Assynt, Tongue, Duriness, and Edderachillies, including the Grazings of Invercashly and Shiness, in the County of Sutherland.

The Parishes of Applecross, Lochcarron, Lochalsh, Kintail, Glenshiel and Glenelg, in the Counties of Ross and Inverness.

The District of Forfarshire, called the Braes of Angus.

The Fort William District of Inverness-shire, including also Ardgour in Argyleshire.

For the best Pen of fifteen Cheviot Gimmers, or One-year-old wes, the property of any grazier within the First and Second

Districts, and which shall be certified at the competitions in A or September 1833, to have been at least twelve months in h session, and to have been, during that year, grazed on th kind of pasture with the remainder of the flock of the like Ten Sovereigns.

For the second best Pen, certified as aforesaid—Five Sove

For the third best Pen, certified as aforesaid—Three Sove

For the best Pen of eighteen Gimmers or Ewes of the l faced breed, from sixteen to twenty months old, the prope any proprietor or tenant within the third District, and which sh certified at the competition to have been at least one year possession, and to have been, during that year, grazed on th kind of pasture with the remainder of the flock of like age- Sovereigns.

For the second best Pen as aforesaid.—Seven Sovereigns.

For the third best Pen as aforesaid.—Three Sovereigns.

The Premiums in the First District were offered for the firs in 1829; in the second in 1831, and are now given fi third year in 1833. In the Second District the Premium given for the first year in 1831; they are again giv 1833, and will be renewed in 1835, and provisionally a 1836, if the resident gentlemen or local associations shal awarded Premiums in 1832 and 1834. In the Third Di Premiums were offered in 1830 for the first year; in 18 the second year; and they will be again given there in 18 their continuance for an additional year will be dependa the circumstance of local Premiums having been first aw in the two intermediate years 1831 and 1833. Premiu improving the breed of black-faced sheep, will be given Fourth District in 1834, for the first year's competition.

The following Members of the Society are appointed Co tees for awarding the Premiums for Sheep:

For the First District.—The Duke of Sutherland; the Marq Stafford; Lord Francis Leveson Gower; Lord Reay; G Dempster, Esq. of Skibo; Kenneth Mackay, Esq. of Torboll gald Gilchrist, Esq. of Ospisdale; Hugh Lumsden, Esq. She the county; Thomas Houston, Esq. of Criech; George Gunn, Rhives; Gabriel Reed, Esq. Gordonbush; John Horsburgh, Tongue House; J. Brander, Esq. Golspie; Angus Leslie, Princinian; Dugald Simpson, Esq. Helmsdale; and any other ners in the district; three a quorum. The Marquis of Staffo

his Lordship's absence, the Factors in the District—to be Conveners.

For the Second District.—The Right Honourable Charles Grant, of Glenelg, M. P.; J. A. Stewart Mackenzie, Esq. of Seaforth, M. P.; Thomas Mackenzie, Esq. of Applecross; David Dick, Esq. of Glensheal; A. K. Mackinnon, Esq. of Skalisaig, and any other members resident in the district: two a quorum—Mr Mackenzie of Applecross, to be Convener.

For the Third District.—The Earl of Airlie, Convener,—the Judges were intimated last year.

For the Fourth District.—The Duke of Gordon and Sir Duncan Cameron of Fassfern, or either of them,—in their absence, Mr Flyter, Sheriff-substitute at Fortwilliam, to be Conveners.

RULES OF COMPETITION.

The Competition for the Premiums in the first two Districts will take place on such days, between the 1st of June and 1st November 1833, as shall be fixed by the Conveners, with the advice of a quorum of their respective Committees; and the Convener of the second District is hereby empowered, with the same advice, to fix the place of competition for that district. The Judges, in deciding the Premiums for Sheep, will have regard both to the wool and carcass of the animal. The Regulations for Cattle Shows, in regard to fixing the Competition—the previous intimations to Judges and Competitors—the placing of the Stock, and the number of Competitors required for competition—the power to make provisionally an allowance for Stock of merit, in the event of deficiency in number—authority to divide the three Premiums into four—the first Premium, not being under Eight Sovereigns—the rules as to awarding first and second Premiums, and prohibiting Members acting as Judges, who are also Competitors; the regulations relating to extra expenses, and the manner in which the reports are to be certified and transmitted, are severally hereby declared to be applicable to the Premiums for Sheep.

The Sheep exhibited for the Premiums in the first and second districts must be certified, to the satisfaction of the Judges of competition, to have been selected from hirsels consisting of not less than one hundred, of the same kind and age; that such hirsel has not been, at any time, selected from the rest of the Competitor's stock, or reared from a hirsel of selected ewes; that the hirsel has not, at any time, been fed on turnips or other green crop, nor upon artificial grasses, nor differently treated from the whole stock of the respective ages belonging to the Competitor, it being the object of the Society to award these Premiums for Cheviot Sheep, reared exclusively upon hill pastures—Lairg is fixed as the place of competition for the first district.

The *Note* annexed to the Rules of Competition for the Premiums for Cattle, is applicable also to the Districts for Sheep, in which the Premiums will be continued by the Society for an additional period, on the conditions specified in the said note.

§ III. WORK HORSES.

PREMIUMS FOR IMPROVING THE BREED OF DRAUGHT HORSI

1. *The County of Caithness.*
2. *The County of Ayr.*

For the best Stallion, from three to twelve years old, for improvement of the Breed of Draught Horses within the co of Caithness, and for this purpose to be shewn after the Prem has been awarded, at Wick, Thurso, Dunbeath, and Reay, at times as the Members of the Society, resident in the county, fix, at a meeting to be intimated by the Convener for the pur from 1st April to 1st August 1833—Ten Sovereigns.

For the best Mare for breeding Draught Horses, which have had at least one foal, *bona fide* the property and in posse of any tenant in the said district, from 1st January 1833 t day of competition—Eight Sovereigns.

For the best three year old Entire Colt or Filly, *bona fid* property and in possession of any tenant in said district— Sovereigns.

For the best Stallion of the age and description above s fied for the second district, kept to serve in the county of Ayr, the Premium has been awarded, and for this purpose, to be s at Kilmarnock, Mauchline, Ayr, and Maybole, at such times, 1st April to 1st August 1834, as the Members of the Society dent in the county shall fix, at a meeting to be intimated by Convener, for the purpose—Ten Sovereigns.

For the best Mare for breeding Draught Horses, which have had at least one foal, *bona fide* the property and in posse of any tenant in the second district, from 1st January 1834 t day of competition—Eight Sovereigns.

For the best three year old Entire Colt or Filly, *bona fid* property of and bred by any tenant in said district—Five S reigns.

RULES OF COMPETITION.

The time and place of competition for the premiums are to be fixed by the veners, with the concurrence of at least a quorum of the respective Commi and are to be published by the Convener at the church doors in due time, such other manner as shall be thought by him and a quorum of the Com fectual for the information of those interested.

The competition to take place in the first district betwixt 20th March a May 1833, and in the second district within the same period in 1834. T

ulations for Cattle Shows in regard to fixing the competition—the previous intimation to Judges and Competitors—the power of the Judges to withhold the premiums, if the animals produced shall be of inferior character—those relating to extra expenses—and against Competitors being also Judges—and the manner in which the reports are to be certified and transmitted to the Society, are severally hereby declared applicable to the premiums for horses.

The premiums will be continued in the first district for 1835, and in the second district for 1834, provided premiums for the same description of stock, to an amount not less than one-half of those offered by the Society, shall have been awarded by the resident gentlemen, or by local associations, in the intermediate years 1833 for the second district, and 1834 for the first district. Reports of these intermediate local shows, signed by at least two members of the Society, to be transmitted to the Secretary of the Society, on or before the 10th December in each year, in order to entitle the districts to any claims for the additional year's premiums.

The Members of the Society in the several districts are appointed Committees for regulating every thing relative to the Competitions, with power to name Sub-Committees of their number for attending to the necessary details.

FOR THE FIRST DISTRICT,—James Traill, Esq. of Ratter; in his absence William Horne, Esq. of Southel, Convener of the Committee of resident members; three a quorum.

FOR THE SECOND DISTRICT,—John Ferrier Hamilton, Esq. of Westport, Convener of the Committee of resident members; three a quorum.

NOTE REGARDING THE IMPROVEMENT OF THE BREED OF HORSES IN SCOTLAND.

The attention of the Directors has been for some time particularly drawn to the deterioration of the breed of horses in many parts of Scotland; and they are quite satisfied that some decided measures must be adopted to increase the number of really useful stallions throughout the country. The Veterinary Committee have made one report upon this subject, containing some valuable suggestions; but the Directors have deemed it most prudent to recommit the subject, and to postpone any final arrangements for another season, in order to secure the most satisfactory attention to this important department of rural economy.

§ IV. SWINE.

PREMIUMS FOR IMPROVING THE BREED OF SWINE.

1. *The Counties of Moray and Nairne.*
2. *The Counties of Aberdeen and Kincardine.*

For the best Boar, not under twelve months, nor exceeding four years old, *bona fide* the property and in possession of any pro-

prietor or tenant in the counties of Moray and Nairne in au
1834—Seven Sovereigns.

For the second best—Three Sovereigns.

For the best Breeding Sow of the same age—Four Sovere

For the second best—Two Sovereigns.

These Premiums to be awarded for animals that are consi
most profitable and best suited for the purpose of curing
Pork. Attention is recommended to the introduction o
Berkshire or Suffolk breed of swine, as being the best for c
pork.

The Competitions are to be held at such times as the Soc
members resident in the counties shall fix, at a meeting
intimated by the respective Conveners for the purpose.
meeting is also authorised to name a Committee for man
all details, and to fix the necessary regulations for compet
A report of the award of the premiums, with a copy of th
gulations of competition, to be transmitted to the Secreta
or before 10th December 1834; Major Cumming Bru
Roseisle and Kinnaird, in his absence Peter Brown,
Linkwood, to be Convener for the first district. Sir I
Horn Elphinstone, Bart., in his absence, Alexander T
son, Esq. of Banchory, to be Convener for the second dis
The Competition for the first district will be held at Fo
and that for the second district at Aberdeen.

The premiums were given in the second district in 1832, and
continuance in 1834 was made dependent on the award o
same description of premiums in the year 1833, by the gu
men of the district, or any local association therein. The
tinuance of the premiums, in the first district, in 1836, w
dependent on a similar condition as to the award of local
miums in 1835. A report of the award of the local prem
signed by at least two members of the Society, to be tra
ted to the Secretary of the Society, from the second distri
or before the 10th December 1833, and for the first distri
or before the same period in 1835.

CLASS V.

PRODUCTS OF LIVE STOCK.

§ I. CURING BUTTER.

DISTRICT.—*The County of Orkney.*

The Premiums given, and regulations suggested, for pro
ing an improved system of Curing Butter, having been pro

tive of highly satisfactory results, the following Premiums are offered in the Islands of Orkney.

To the owner of any Dairy in the above district who shall make and cure the best quality of Butter for the market, not being less than two cwt. (112 lb. to the cwt. of 16 oz. to the lb.) during the season 1833—Six Sovereigns.

For the second best quality, as aforesaid—Four Sovereigns.

For the third best quality, as aforesaid—Three Sovereigns.

For the fourth best quality, as aforesaid—Two Sovereigns.

CONDITIONS.

The Butter must be certified on oath to have been made and cured on the competitor's farm, during the season 1833; and the affidavit must bear that the sample of one or more kits or firkins produced is a fair average of the quantity made and cured as aforesaid. It shall be inspected by a Committee of the Members of the Society resident within the district, at a meeting to be called by the Conveners for that purpose, at Kirkwall, on such days as the Conveners may appoint. In the event of two or more competing lots being deemed equal in quality, the premium will be awarded to the larger quantity. Although not required as a condition, it is strongly recommended, as affording facilities for sales, that the Butter should be packed in firkins containing 56 lb. each, or in earthen vessels which have not been glazed with preparations of lead, and of such size as may be suitable for sales. The successful candidates, before receiving the premiums, are required to transmit to the Secretary a detailed report of the whole process followed by them in the manufacture of their Butter. A report of the award of the premiums to be lodged with the Secretary of the Society, on or before the 10th December 1833. John Traill Urquhart, Esq. of Ellsness and Thomas Balfour, Esq. younger of Elwick, or either of them, to be Conveners.

The Conveners have undertaken, on application to either of them, to furnish intending Competitors with a copy of Observations on Making, Curing, and Casking of Butter.

§ II. MAKING CHEESE.

DISTRICTS.

1. *The County of Wigton.*
2. *The County of Argyll.*

The sum of Fifteen Sovereigns will be placed at the disposal of the Members of the Society, in *each* of the above districts, Five

Sovereigns more being provided by each of the counties, or b any local association therein, to be divided and apportioned s such manner as to the respective Committees shall seem best, f the improvement of Cheese-making in the said districts in 183 under the regulations after mentioned.

CONDITIONS.

The Cheese shall be made to resemble as much as possible the be varieties of English cheese, and the whole quantity made by each com petitor shall not be less than one cwt. (112 lb. of 16 oz.) Each Com petitor shall lodge with the Convener of the Committee a memorandu specifying the kinds of cheese for which he is to compete, and a certifica on oath must be lodged with the Convener, that two or more cheeses t be produced are a fair average sample of the kind competing, made i that year by the competitor, and one of the cheeses of the successf specimens shall be transmitted to the Secretary for the inspection of th Society.

It is expected that intending competitors shall communicate the intention to the Convener, that he may have it in his power to inspe the Dairies if he thinks proper; and the successful competitors, befo receiving payment of their premiums, are required to transmit to th Secretary a detailed report of the whole process employed by them i the manufacture of their cheese, and specifying the quantities of chee made by them of the description offered for competition, the object b ing not to produce a few superior cheeses, but to improve the syste which, in some districts of Scotland, where premiums have been give has been found to have attained great perfection,—as well as to asce tain the general quantity of superior cheese to be procured from th district competing. The cheeses to be examined and the premiu awarded by the local Committee, at such place as the Society's Mem bers shall appoint, at a meeting to be intimated by the Convener f that purpose, and which meeting shall also name a Committee for fixi such farther regulations as may be necessary, and arranging all detail A report of the award of the premiums from each district to b transmitted to the Society, on or before the 10th December 1833.

The following members of the Society are named Conveners o ne resident members, viz.:—

John Cathcart, Esq. of Genoch, for Wigtonshire; and Robe Maclachlan, Esq. of Maclachlan, for the county of Argyll.

SKIM-MILK CHEESE.

The Society being of opinion that in districts where butter be staple produce of the dairy, cheese made from skimmed mi

be so improved in quality as to be brought into successful petition with Dutch cheese, a large quantity of which, from same material, is annually imported into this country, have lved to offer district premiums for this object.

DISTRICTS.

The Counties of Aberdeen and Kincardine.
The County of Banff.

'o the owner of any Dairy, in the first district, who shall make ale the best quality of cheese, from skimmed milk, not being than one cwt. (112 lb. of 16 oz.) during the season 1833— ht Sovereigns.
or the second best quality as aforesaid—Five Sovereigns.
or the third best quality as aforesaid—Two Sovereigns.
imilar premiums will be given in the second district for the 1834.

In the event of two or more competing lots being deemed equal in quality, the premiums to be awarded to the greater quantity, and one of the cheeses of the successful specimens shall be transmitted to the Secretary, for the inspection of the Society. The cheese, in the first district, must be certified on oath to have been made during the season 1833, and in the second district during the season 1834, entirely from skimmed milk, and that the samples of two cheeses or more to be produced, are a fair average of the produce of the Dairy.

It is expected that intending competitors shall communicate their intention to the Convener, that he may have it in his power to inspect the Dairies, if he thinks proper; and the successful candidates, before receiving their premiums, are required to transmit to the Secretary a detailed account of the whole process followed by them in the manufacture of their cheese. The cheeses to be inspected at such place as the Society's members shall fix, at a meeting to be intimated by the Convener for that purpose, and which meeting shall also name a Committee for fixing such farther regulations as may be necessary, and managing all details. Sir R. D. Horn Elphinstone, Bart. Convener for the first district; Colonel Gordon of Park, in his absence, Patrick Steuart, Esq. of Auchlunkart, Convener for the county of Banff. The competition in the first district to be held at Aberdeen, and in the second district at Keith. A report of the award of the premiums in the first district, to be

transmitted to the Society on or before the 10th
1833; and for the second district, by the same
1834.

§ III. CURING BEEF AND PORK.

DISTRICT.—*The Counties of Lanark, Renfrew, and Da*

To the person in the Counties of Lanark, Renfrew, a
barton, who shall, between 1st May 1833 and 1st May 18
salted or cured with rock or bay salt the greatest quantity
beef of good quality, not under 10,000 lb., to be shippe
ports of Glasgow, Port Glasgow, or Greenock—A Piece
of Twenty Sovereigns value, or that sum in money.

To the person in the foresaid district who shall, during
period, have salted and cured, or have pickled, the greate
tity of pork, not under 5000 lb., to be shipped as afore
Piece of Plate of Ten Sovereigns value, or that sum in m

CONDITIONS.

It is required that the beef or pork shall have been fed in
and that it shall be cured and packed in tierces or barrels in
as similar to that practised in Ireland as circumstances wi
The quality to be ascertained by such inspection on the sp
Committee after named shall appoint, to one of whom all
competitors shall give notice of their intention of competing
beef cured previous to such notice shall be allowed in competi

The Committee are empowered to require satisfactory evi
the mode of curing, packing, or other circumstances which ma
to them material, with the view of ascertaining how far the
provisions, so beneficially practised in Ireland, may be advant
introduced into some districts of Scotland. The Committee
ther required to certify the claims of the several competitor
report upon the competition to the Society on or before the
cember 1834. The following Members of the Society are
Committee for regulating all details:—

The Hon. James Ewing, M. P., Lord Provost of Glasgow
bald Campbell, Esq. of Blythswood; Sir M. S. Stew
M. P.; Sir John Maxwell, Bart. M. P.; Sir Archibal
bell, Bart.; John Maxwell, Esq. M. P.; James Ow
M. P.; Robert Wallace, Esq. of Kelly, M. P.; the C
gistrate of Greenock; the Chief Magistrate of Port
Alexander Smollett, Esq. younger of Bonhill; Lor

bell, Esq.; James Dennistoun jun. Esq. of Dennistoun; James Smith, Esq. of Jordanhill; Colin Campbell, Esq. Possil; Mungo Campbell, Esq. Hallyards; Dr James Cleland, Glasgow; and Claud Marshall, Esq. Sheriff-substitute of Greenock.

The Lord Provost of Glasgow, in his absence Mr Campbell of Hallyards, Convener.

CLASS VI.

COTTAGES.

1. PREMIUMS IN MONEY TO COTTAGERS FOR THE CLEANEST KEPT COTTAGES.

DISTRICTS.

1. *The County of Aberdeen.*
2. *The County of Bute and Arran.*
3. *The County of Argyll.*
4. *The County of Kincardine.*

In order to excite the attention of Cottagers to keeping their cottages neat and clean, Ten Premiums of Two Sovereigns each, will be awarded to Ten Cottagers in each of the above districts, paying L. 5 of rent or under—or whose cottage and land annexed to it does not exceed that annual value—who shall be certified by two members of the Society, resident in the district, or by one member of the Society and the clergyman of the parish, to have been distinguished for the general neatness and cleanliness of the interior as well as the exterior of his or her cottage (including the garden, should there be one attached to it), and to be deserving, on that account, of this mark of the Society's approbation.

CONDITIONS.

The certificate must bear that the cottage has been personally inspected by the parties granting it, and must give some description of the merits of the cottager in respect of the manner in which the cottage as well as the immediately adjoining space have been kept, specifying, at the same time, the name, designation, and residence of the competitor. For the First and Second Districts, the certificates must be transmitted to the Secretary of the Society on or before the 10th of November 1833, and for the Third and Fourth, on or before the 10th November 1834.

Should there be more than ten competitors in each district, the So-

ciety will be influenced by the circumstances of the case in decidi what claims are to be preferred; but, in every case, their decision wi have regard exclusively to the neatness and cleanness with which th cottage and immediately adjoining space have been kept, and not t the construction of the cottage, or to the materials of which it is com posed.

2. MEDALS TO COTTAGERS.

In the view of giving still farther encouragement to Cottager of the above description, who do not reside in the counties i which the regular premiums are in operation at the time, and, a the same time, of giving aid to local associations and public spi rited individuals, establishing or continuing, at their own ex pense, premiums for the like object, the Society have assigned Six Cottage Medals annually to such associations or public spirited individuals as apply for the same, and may be desirous to add that testimony of approbation to such premiums as they them selves bestow. Applications for these medals must be accompa nied by a report, certified in the terms required by the preceding conditions, describing the merits of the cottager, and the nature of the encouragement which has been afforded by the parties ap plying.

3. MEDALS FOR VILLAGES.

As it is desirable to excite a similar spirit of improvement among the working classes in villages, having a population under 500 persons, and where there is no established system of police, the Society is ready to grant Medals annually to any benevolent asso ciation wishing to co-operate with the Society, in the important design of promoting greater attention to cleanliness and order in any such villages, and to contribute rewards from funds raised in their respective localities. Medals will likewise be placed at the disposal of any two or more Members of the Society forming hemselves into a Committee for the improvement of a village with which they may be locally connected.

Local Associations or Committees intending to avail themselves of this offer, are requested to transmit a report of their regulations and intended plan of proceedings to the Society, on or before the 1st of July annually, after which they will be informed of the pro portion of Medals which the Society can put at their disposal.

Associations or local Committees which may have Medals grant to them will be required to send an account of their applica

tion, with observations on the degree of effect which may appear to have been produced on the habits of competitors.

4. PREMIUMS TO COTTAGERS FOR PROMOTING ATTENTION TO THE CULTIVATION AND MANAGEMENT OF BEES.

DISTRICTS.

1. *The Counties of Inverness, Ross, and Cromarty.*
2. *The Counties of Linlithgow and Stirling.*

To the Cottager in the first district paying L. 5 of rent, or under, or whose cottage and land annexed to it does not exceed that annual value, who, between 1st June and 1st October 1833, shall have raised the greatest number of Hives of Bees, not fewer than Seven, from stocks of his or her own property, none of the hives weighing under 20 lb., exclusive of the weight of the material of the hive or skep—A Premium of Five Sovereigns.

To the Cottager in the same district who shall have raised the second greatest number, as aforesaid—Three Sovereigns.

To the Cottager in the same district who shall have raised the third greatest number, as aforesaid—Two Sovereigns.

Certificates of the number of Hives, and their several weights, making allowance for the weight of the skeps (which are to be weighed before being used), signed by two Members of the Society resident in the neighbourhood, or by one Member and the Clergyman of the parish, to be transmitted to the Secretary on or before 10th November 1833.

Similar premiums will be given in the Second District for Hives raised between the 1st June and 1st October 1834.

CLASS VII.

WOODS AND PLANTATIONS.

1. HONORARY PREMIUM FOR PLANTING.

To the Proprietor who shall communicate to the Society, on or before the 10th of November in any year, a satisfactory Report on the Planting of Land, founded on experiment; and who shall accordingly have planted on his own property an extent of not less than One hundred and fifty acres, within a period of five years preceding the date of his Report—The Gold Medal.

It is required that the Report shall relate more especially to tract of land which forms the subject of the communica detailing the necessary particulars regarding its soil, clim and exposure; the kinds, ages, and number of the plants u the mode of planting adopted, and the expenses of the w and the writer is invited to state those more general obse tions on the principles and practice of planting which his kn ledge and experience on the subject may enable him to com nicate.

2. RAISING THE PINUS SYLVESTRIS FROM NATIVE SEED.

To the Nurseryman, or other person in Scotland, who shall, tween the 30th October 1830 and 30th October 1833, have rai on rather poor nursery-ground, and sold for planting, the grea number of plants, not fewer than Three Millions, of the *Pi sylvestris*, from seed imported from Norway, and taken off heal trees in that country, or taken off healthy and free growing t of the natural grown Pine in the Highland Districts of the co ties of Aberdeen, Moray, and Inverness—Fifteen Sovereigns, Piece of Plate of that value.

Competitors to transmit to the Secretary of the Society, o before 10th November 1833, affidavits in support of the co tion of the seed, specifying the quantity, and the distric which it was collected, with certificates, signed by two M bers of the Society, specifying the soil and thriving state of plants in the nursery ground, and an affidavit of the numb plants sold, to be planted out for timber, and to whom they disposed of.

3. RAISING LARCH FROM NATIVE SEED.

To the Nurseryman, or other person in Scotland, who shall, tween 30th October 1830 and 30th October 1833, have raised old for planting the greatest number of plants, not being f han One Million, of the *Pinus Larix*, or Larch Fir, from mported from the Tyrol, or other regions of the Alps, to wh s indigenous, and taken off healthy trees in the country—T Sovereigns, or a Piece of Plate of that value.

Certificates, similar to those for the *Pinus sylvestris*, to be mitted on or before the 10th November 1833.

INTRODUCTION OF TREES NEW IN THE CULTURE OF SCOTLAND.

To the person who shall, on or before the 20th of October in
year, Report to the Society the introduction of any new spe-
of tree valuable for its timber, or useful in the arts or manu-
tures, and suited to the climate of Scotland,—the Honorary
er Medal, or a Piece of Plate of such value as the communica-
n may be adjudged to deserve.

Satisfactory evidence will be required that the tree introduced is new to Scotland, valuable as regards its uses, and congenial to the soil and climate. A particular account of the tree, including its raising and after-management in its native country, together with the circumstances which led to its introduction, must be furnished. A specimen of the wood must also be transmitted, with an account of the management adopted since the introduction of the tree into this country.

CLASS VIII.

IMPLEMENTS OF HUSBANDRY, AND USEFUL MACHINES.

To the person who shall invent or improve any Instrument or
chine applicable to Husbandry or Rural Economy, and which,
n its utility in saving labour or expense, simplicity or cheap-
s of construction, or other circumstances, shall be deemed by
Society deserving of public notice—The Silver Medal, or
h sum in money as the communication shall appear to de-
ve.

The account of the implement must be accompanied by a model made according to a definite scale, to be deposited in the Society's Museum. The model to be of sufficient dimensions, formed of wood or metal; and the notice or description transmitted with it must specify, according to the best of the inventor's abilities, the purpose for which his invention or improvement is designed.

CLASS IX.

GENERAL SHOW OF LIVE STOCK

AND

AGRICULTURAL MEETING AT STIRLING IN 18

THE Society having resolved to continue a General Sh Live Stock and an Exhibition of Implements and Roots and for Agricultural purposes, and having fixed the Meeting to b at Stirling in the present year, the following Premiums are o to be then awarded by the Society, aided by liberal donations the Local Agricultural Associations, and from the Noblemen Gentlemen of the Counties more immediately connected wit Show. The competition is open to Stock from every distri Scotland.

§I. CATTLE.

SHORT-HORN BREED.

CLASS I. For the best Bull of the pure short-horn breed, exceeding four years and ten months old—Twenty Sovereign

For the second best ditto—Ten Sovereigns.

It is a condition attached to the above Premiums, that the l bitor shall let out the Bull for season 1834, to serve in a trict including a circuit of thirty miles round Stirling, pre L. 60, including the Premium gained, is offered, together the expense of conveyance to and from the hirer's resid and the keeping of the Bull for the season.

II. For the best Cow, of the pure short-horn breed, of age—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

III. For the best Heifer of the same breed, calved afte January 1831—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

IV. For the best two Steers, of the short-horn breed, she most symmetry, fat, and weight, calved after 1st January 18 Fifteen Sovereigns.

For the second best ditto—Ten Sovereigns.

V. For the best two Oxen of the short-horn breed, she most symmetry, fat, and weight, calved after 1st January 18 Fifteen Sovereigns.

VI. For the best two Oxen of the short-horn breed, she ...st symmetry, fat, and weight, calved after 1st January 1 ...d exclusively upon farm produce—Ten Sovereigns.

POLLED BREED.

VII. For the best two Oxen of any polled breed, shewing most symmetry, fat, and weight, calved after 1st January 1829—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

AYRSHIRE BREED.

VIII. For the best Bull of the pure Ayrshire breed, not exceeding four years and ten months old—Twenty Sovereigns.

For the second best ditto—Ten Sovereigns.

It is a condition attached to the Premiums in Class VIII. that the Exhibitor shall let out the Bull for season 1834, to serve as specified in Class I., provided a hire of L. 20 be offered, in addition to the Premium gained, with the expense of conveyance and keep.

IX. For the best Cow of the same breed, of any age—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

X. For the best two Heifers of the same breed, calved after 1st January 1831—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

XI. For the best two Oxen of the pure Ayrshire breed, shewing most symmetry, fat, and weight, calved after 1st January 1830—Ten Sovereigns.

XII. For the best two Oxen of the pure Ayrshire breed, shewing most symmetry, fat, and weight, calved after 1st January 1829—Ten Sovereigns.

WEST HIGHLAND BREED.

XIII. For the best Bull of the pure West Highland breed, not exceeding five years and ten months old—Twenty Sovereigns.

For the second best—Ten Sovereigns.

A condition similar to that in Class 8th, is attached to the Premiums in Class XIII.

XIV. For the best Cow of the pure West Highland breed, of any age—Ten Sovereigns.

For the second best—Seven Sovereigns.

XV. For the best two Heifers of the same breed, calved after 1st January 1830—Ten Sovereigns.

For the second best—Seven Sovereigns.

XVI. For the best two Oxen of the pure West Highl breed, shewing most symmetry, fat, and weight—Fifteen Sc reigns.

For the second best—Ten Sovereigns.

XVII. For the best two Oxen of the pure West Highla breed, calved after the 1st January 1829—Ten Sovereigns.

XVIII. For the best two Oxen of the pure West Highla breed, calved after 1st January 1830, which have been fed exc sively on pasture during the summer and harvest preceding t show—Ten Sovereigns.

XIX. For the best five Oxen of the pure West Highland bre calved after 1st January 1831, which have been bred by the co petitor, and have been fed exclusively on pasture during the su mer and harvest preceding the show—Ten Sovereigns.

FIFE BREED.

XX. For the best two Oxen of the Fife breed, not exceedi five years and ten months old, and shewing most symmetry, f and weight—Ten Sovereigns.

ABERDEENSHIRE HORNED BREED.

XXI. For the best two Oxen of the Aberdeenshire horn breed, not exceeding five years and ten months old—Ten Sovereig

ANY BREED.

XXII. For the best Ox of any breed, pure or cross, shew most symmetry, fat, and weight—Ten Sovereigns.

XXIII. For the best Ox of any breed, pure or cross, fed exc sively on farm produce—Ten Sovereigns.

§ II. SHEEP.

BLACK-FACED BREED.

CLASS I. For the best two Tups, not exceeding forty-f months old—Five Sovereigns.

II. For the best pen of five Ewes, not exceeding five years s seven months old, selected from a hirsel of a regular breedi stock, not fewer than 100, and the pen having reared lambs the season, to the 1st of July—Five Sovereigns.

III. For the best pen of five Gimmers—Five Sovereigns.

IV. For the best pen of five Wedders of any age, shewing m symmetry, fat, and weight—Five Sovereigns.

CHEVIOT BREED.

V. For the best two Tups of the Cheviot breed, not exceeding forty-five months old—Five Sovereigns.

VI. For the best pen of five Ewes, not exceeding five years and seven months old, selected from a hirsel of a regular breeding stock, not fewer than 100, and the pen having reared lambs for the season to the 1st of July—Five Sovereigns.

VII. For the best pen of five Gimmers—Five Sovereigns.

VIII. For the best pen of five Wedders of any age, shewing most symmetry, fat, and weight—Five Sovereigns.

LEICESTER BREED.

IX. For the best Tup of the improved Leicester breed—Five Sovereigns.

X. For the best two Ewes, not exceeding four years and seven months old—Five Sovereigns.

CROSS BREED.

XI. For the best pen of five fat Wedders, cross of a Leicester Ram and black-faced Ewe—Five Sovereigns.

XII. For the best pen of five fat Wedders of any other cross, the cross being specified in the certificate—Five Sovereigns.

§ III. HORSES.

CLASS I. For the best Stallion for the improvement of the breed of Draught Horses, not exceeding eight years and five months old—Twenty Sovereigns.

It is a condition attached to this Premium, that the Exhibitor shall be obliged to let out the Prize Horse for season 1834, to serve in a district including a circuit of thirty miles round Stirling, provided Seventy Sovereigns, including the Premium, shall be offered at the Show, or within two months after it.

II. For the best breeding Mare for agricultural purposes, having had at least one foal, and not being under six, nor exceeding twelve years and five months old—Ten Sovereigns.

III. For the best Stallion of the Cleveland breed, not exceeding eight years and five months old—Twenty Sovereigns.

The Exhibitor shall be obliged to let out the Prize Horse for season 1834, to serve in a district including a circuit of thirty miles round Stirling, provided one hundred sovereigns, including the Premium, shall be offered at the Show, or within two months after it.

§ IV. SWINE.

CLASS I. For the best Boar—Five Sovereigns.

II. For the best Sow—Five Sovereigns.

III. For the best three Pigs, not exceeding forty weeks old—Five Sovereigns.

In awarding the Premiums for this description of stock, attention will be paid to the breeds most suitable for being reared and fed for family use. The name of the breed to be specified in the certificate.

§ V. EXTRA STOCK, IMPLEMENTS, ROOTS, AND SEEDS.

For Extra Stock of any kind, not shown for any of the above Premiums, and not exceeding in one lot five Cattle or ten Sheep, and for Implements, Roots, and Seeds, &c., Premiums will be awarded and apportioned by the Committee and Judges in Money, Plate, or Honorary Medals, to the value in whole of Fifty Sovereigns.

MEMORANDUM REGARDING SWEEPSTAKES.

Lists for Sweepstakes will be made up in due time for those Classes of Stock which may appear most likely to meet the views of Exhibitors. In the mean time, nominations may be made to the Secretary of the Society at Edinburgh, or to Mr Robert Campbell at Stirling, the Clerk and Treasurer to the Local Committee.

GENERAL REGULATIONS FOR THE SHOW.

1. The Competition will take place at Stirling, on Friday the 4th of October 1833, being in the week immediately preceding the great Falkirk Tryst.

2. The name, residence, and post-town of the Exhibitor, the name of the Breed, the number of the Class in which the Animals are to be exhibited, their age, and, in the case of Fat Stock, the kind of food on which they have been fed, must be regularly certified, and the Certificate signed by the Exhibitor, agreeably to the form annexed, must be duly lodged, as required by Article 5th.—The name and residence of the Breeder, and the Pedigree of the Stock, so far as known, must also be given.

3. In estimating the ages above prescribed for Competing Stock, the following rules are to be observed:—viz. The age of Cattle, in all the Classes, will be calculated from the 1st of January of the year in which they were calved; of Horses from the 1st of May of the year in which they were foaled; and of Sheep from the 1st of March of the year in which they were lambed.

4. It is not required as a Condition that any of the following descriptions of Stock, viz. Bulls, Cows, or Heifers, of the Short Horn breed, entire Horses, Mares, Boars and Sows, Leicester Rams and Ewes, shall have been bred in Scotland, provided they be *bona fide* the property of an exhibitor in Scotland from 1st March 1833. All other descriptions of Stock (extra Stock excepted) must have been bred in Scotland. Cows exhibited for the Premiums in Classes II. IX. and XIV. must have had a Calf during the Spring or Summer preceding the Show. Evidence will also be required that the Bulls for which Premiums are awarded have had produce during the preceding season.

5. The certificates must be lodged with the Secretary before twelve o'clock on Saturday the 28th of September, at which time a list will be made up by him; and no Stock will be allowed to enter into competition, or to be shown, which is not included in that list. *Printed forms* of Certificates may be had on application at the Society's Hall, No. 6, Albyn Place, Edinburgh, or at Mr Campbell's Office, Stirling. On or before Friday the 27th of September, the Secretary will be at Stirling, to answer inquiries, attend to details, and to receive certificates. In the mean time, certificates may be lodged with him at Edinburgh, or with Mr Campbell at Stirling.

6. A responsible person, on the part of the Exhibitor, must attend when the certificates are lodged, to give explanation, if it should be necessary, and receive instructions as to matters of detail at the Exhibition. The person or persons so attending must be acquainted with the various particulars required to be certified regarding the Stock of which they are in charge, more especially the mode of feeding in the case of Fat Stock; and it shall be competent to the Committee to require the Exhibitor, or the person in charge of the Stock, to confirm the certificates upon oath on the day of competition, in such cases as they think necessary.

7. A ticket or order will be delivered by the Secretary to the person in charge of each lot, for its being received into the Show Yard; and no Stock whatever can come within the premises without such warrant. One servant only for each lot can be admitted, and who must afterwards continue in charge of that lot in the Show Yard. Bulls must be secured by a ring or screw in the nose, with a chain or rope attached, otherwise they cannot be admitted into the Show Yard. There are screws for temporary use, which competitors will find it convenient to provide for bulls that have not been usually ringed.

8. The Stock exhibited for the Premiums, (under the exception after mentioned), are to be fed solely on farm produce, including oil-cake,—but excluding distillery wash and grains, as being accessible only to a few competitors. If oil-cake has been used, the quantity is to be stated in the certificate. The competition in Classes II. III. IV. V. and XXII. is open to Cattle fed on distillery produce.

9. The distance each animal travels to the S w, [illegible], in the case of Fat Stock, the date of being put to fatten, to be ed.

10. A competitor may show more than one lot in any class, but shall not gain more than one Premium for Stock in the same class. It shall not be competent to enter a lot in one class, and afterwards to withdraw it for competition in another class, unless by direction of the Committee. An animal having already gained the first premium in his class, at any of the Society's General Shows of Stock, which have been held at Edinburgh, Glasgow, Perth, Dumfries, Inverness, or Kelso, is not to be shewn again in competition in the same class, but may be exhibited as Extra Stock, or entered for Sweepstakes.

11. Gentlemen intending to exhibit Extra Stock, must intimate to the Secretary, and describe the Stock to be shewn, six days before the competition. Sweepstakes to be reported in due time, in order that proper Judges may be appointed, and other necessary arrangements made.

12. The Stock exhibited will not be distinguished in the Show Yard by the name of the breeder, feeder, or owner (until after the premiums are decided), but by *tickets* or *numbers* to be affixed to each lot, corresponding to the list to be made up by the Secretary.

13. The Committee of the Society appointed to conduct the arrangements for the Show, will appoint skilful persons to act as Judges for the several classes, and to report to the Committee the lots, which, in their opinion, are entitled to premiums. In forming their opinion, the Judges will have regard to the instructions to be delivered for their guidance, and particularly to symmetry, size, early maturity, purity, and general qualities characteristic of the different breeds they have to judge of, making due allowance for age, feeding, and circumstances peculiar to the cases which come before them.

14. The Committee of the Society, and the Judges to be named by them, will begin to view the Stock on the morning of the Show, at ten o'clock precisely; and the usual time will be allowed to the Judges for examining the Stock and forming their opinion, before the admission of any person, except a servant in the charge of each lot. To prevent confusion, the different lots must be brought to the ground at or before eight o'clock in the morning.

15. On their arrival at the gate, instructions will be given as to the particular part of the Show Yard to be occupied by each class. The Stock will be withdrawn, and the Show Yard shut at four o'clock.

16. Persons intending to exhibit Implements, Roots, or Seeds, must communicate with the Secretary, and lodge with him a memorandum descriptive of the articles to be shewn, at least five days before the Meeting.

Finally, no change can, under any circumstances, be made upon the General Regulations established by the Society for Agricultural Meetings and General Shows of Live Stock, unless regularly submitted and approved of at a meeting of the Directors in Edinburgh, and duly intimated to Competitors.

His Grace the Duke of Buccleuch and Queensberry, K. T. President; the Most Noble, and Right Honourable the Vice-Presidents; the Lords Lieutenants, Vice-Lieutenants, and Conveners, with an adequate number of the Members of the Society resident in the district, immediately connected with the Meeting, together with the Secretaries of the Local Agricultural Associations, have been appointed a Committee for regulating all details connected with the Agricultural Meeting and General Show of Live Stock at Stirling. William Murray, Esq. of Polmaise, in his absence Robert Bruce, Esq. of Kennet, to be Convener of the Committee.

A Deputation of the Directors of the Society will be at Stirling two days before the Meeting.

FORM OF CERTIFICATE ABOVE REFERRED TO AS APPLICABLE TO FAT OXEN.

I near in the county of , do certify, That my Ox (or Oxen, as the case may be), of the breed of Live Stock to be shewn at the General Show of Live Stock at Stirling, for the Premium in Class was bred by Mr of ; he is now years and months old, and was fed by me on . The weight of cake or seed (if any) he consumed was lbs.; and the quantity (if any) of corn, . He has not at any time been fed on distillery wash or grains (or he has been so fed, for so long, as the case may be). He will have to travel on foot miles or thereby, from the place of feeding to the Show at Stirling. He was first put up to fatten on or about the day of Witness my hand this day of 1833.

Signature of the Exhibitor.

Any observations as to the animal's appearance, and state of flesh when put up to feed, or other particulars which the Exhibitor may think material, and more especially the pedigree, may be subjoined to the above certificate. The certificates for Breeding Stock, and for Horses, Sheep, and Pigs, and for distillery fed cattle, will be varied in conformity to the regulations applicable to these descriptions of Stock.

If the lot has not been bred by the Exhibitor, it is particularly requested that the Breeder, if known, may be mentioned.

GENERAL SHOW OF LIVE STOCK

AND

AGRICULTURAL MEETING AT ABERDEEN IN 183

The Society having resolved to hold the General Show of L Stock and Agricultural Meeting for 1834 at Aberdeen, the lowing Premiums are offered to be then awarded by the Soci aided by liberal donations from the Noblemen and Gentlemen the Counties, and from the Local Associations more immedia connected with the Show.

§ I. CATTLE.

SHORT-HORN BREED.

CLASS I. For the best Bull, of the pure short-horn breed, n exceeding six years and ten months old—Twenty Sovereigns.

For the second best ditto—Ten Sovereigns.

It is a condition attached to the above Premiums, that the exhibit shall be obliged to keep the prize bull within the four counti of Aberdeen, Banff, Forfar, and Kincardine, and to allow hi to serve at least forty cows during the season 1835, on pa ment of ten shillings and sixpence for each cow.

II. For the best Cow, of the pure short-horn breed, not excee ing ten years and ten months old—Ten Sovereigns.

III. For the best Heifer, of the same breed, not exceedin thirty-four months old—Ten Sovereigns.

IV. For the best Heifer, of the same breed, not exceedin twenty-two months old—Seven Sovereigns.

ABERDEENSHIRE BREED.

V. For the best Bull, of the above breed, not exceeding seve years and ten months old—Twenty Sovereigns.

VI. For the best Cow, of the same breed, not exceeding te years and ten months old—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

VII. For the best Heifer, of the same breed, not exceedin thirty-four months old—Ten Sovereigns.

VIII. For the best ditto, not exceeding twenty-two month old—Seven Sovereigns.

IX. For the best Ox, of same breed, not exceeding four yea ten months old—Ten Sovereigns.

X. For the best pair of Oxen, of same breed, not exceeding four years and ten months old—Fifteen Sovereigns.

ABERDEEN AND ANGUS POLLED BREED.

XI. For the best Bull, of the above breed, not exceeding seven years and ten months old—Twenty Sovereigns.

For the second best ditto—Ten Sovereigns.

It is a condition attached to the above premiums for bulls, in Classes V. and XI., that the exhibitors shall be obliged to keep the premium bulls within the four counties, and allow them to serve at least forty cows each during the season 1835, on payment of five shillings for each cow.

XII. For the best Cow, of the same breed, not exceeding ten years and ten months old—Ten Sovereigns.

For the second best ditto—Seven Sovereigns.

XIII. For the best Heifer, of the same breed, not exceeding thirty-four months old—Ten Sovereigns.

For the best ditto, not exceeding twenty-two months old—Seven Sovereigns.

XIV. For the best Ox, of the same breed, not exceeding four years and ten months old—Ten Sovereigns.

XV. For the best ditto, not exceeding forty-six months old—Seven Sovereigns.

WEST HIGHLAND BREED.

XVI. For the best Cow, of the pure West Highland breed, not exceeding ten years and ten months old—Ten Sovereigns.

XVII. For the best two Oxen, of the same breed, not exceeding four years and ten months old—Fifteen Sovereigns.

ANY BREED.

XVIII. For the best Ox, of any age or breed, pure or cross, shewing the most symmetry, fat, and weight—Ten Sovereigns.

CROSSES.

XIX. For the best Ox, first cross of short-horn with Aberdeen, Banff, Forfar, or Kincardine stock, of any age, shewing most symmetry, fat, and weight—Ten Sovereigns.

XX. For the best Ox, first cross with the short-horn, not exceeding forty-six months old, shewing most symmetry, fat, and weight—Seven Sovereigns.

XXI. For the best ditto, not exceeding thirty-four months old—Seven Sovereigns.

§ II. HORSES.

CLASS I. For the best Draught Stallion, not exceedin years and five months old—Fifty Sovereigns.

It is a condition attached to this Premium, that the Exhibi be obliged to let out the Prize Horse for season 1835, within the four counties, provided the owner of the ho be guaranteed in a subscription of L. 80, for serving n twenty shillings per head; the District in which the to serve to be determined by lot, drawn under the sup dence of the Judges, and evidence must be produced Prize Horse has had produce.

For the second best do. do. (under the same condition serving)—Thirty Sovereigns.

II. For the best draught Stallion, not exceeding three ye five months old, being the *bona fide* property of a residenter one of the four counties—Thirty Sovereigns.

It is a condition attached to this premium, that the hor serve mares within the four counties, during the yea at twenty shillings per head.

III. For the best breeding Mare, for Agricultural pu having had at least one Foal—Ten Sovereigns.

IV. For the best pair of Work Horses or Mares, not und nor above ten years and five months old—Ten Sovereigns.

V. For the best Colt, for Agricultural purposes, being a ing, and not exceeding thirty-four months old—Eight Sove

VI. For the best Filly, for Agricultural purposes, not ex thirty-four months old—Eight Sovereigns.

§ III. SWINE.

CLASS I. For the best Boar—Five Sovereigns.

II. For the best Sow—Four Sovereigns.

III. For the best three Pigs, not exceeding fifteen mon -Three Sovereigns.

In awarding the Premiums for this description of Stock, a will be paid to the breeds most suitable for being rea fed for family use.

§ IV. SHEEP.

BLACK-FACED BREED.

CLASS I. For the best two Tups, not exceeding for ...ains old—Five Sovereigns.

II. For the best pen of four Ewes, not exceeding five ye ...en months old, selected from a hirsel of a regular br

stock, not fewer than 100, and the pen having reared Lambs for the season to the 10th July—Five Sovereigns.

III. For the best pen of five Gimmers—Five Sovereigns.

IV. For the best pen of three Wedders, not more than four years and seven months old—Five Sovereigns.

V. For the best pen of three Wedders, of any age, shewing most symmetry, fat, and weight—Five Sovereigns.

WHITE-FACED BREED.

VI. For the best two Tups, of the indigenous white-faced breed of Scotland—Five Sovereigns.

VII. For the best pen of four Ewes, of the same breed—Five Sovereigns.

CHEVIOT BREED.

VIII. For the best two Tups, not exceeding forty-five months old—Five Sovereigns.

IX. For the best pen of five Ewes, not exceeding five years and seven months old—Five Sovereigns.

LEICESTER BREED.

X. For the best Tup, not under two years old—Five Sovereigns.

XI. For the best two Ewes, not exceeding four years and seven months old—Five Sovereigns.

CROSS BREED.

XII. For the best pen of three Wedders, a cross between Cheviot Ewes and Leicester Tups, and shewing most symmetry, fat, and weight—Five Sovereigns.

XIII. For the best pen of three Wedders, a cross between Cheviot Rams and Black-faced Ewes—Five Sovereigns.

§ V. EXTRA STOCK, IMPLEMENTS, ROOTS, AND SEEDS.

For Extra Stock of any kind, not shown for any of the above Premiums, and not exceeding in one lot five Cattle, or ten Sheep, and for Implements, Roots, Seeds, &c. Premiums will be awarded and apportioned, by the Committee and Judges, in Money, Plate, or Honorary Medals, to the value, in whole, of Fifty Sovereigns.

GENERAL REGULATIONS.

The Competition will take place at Aberdeen, on the first Friday of October 1834.

The Competition is open to Stock from any part of Scotland.

It is not required as a condition that any of the following descriptions of St viz. Bulls, Cows, or Heifers, of the short-horn breed, entire Horses, Mares

Boars, and Sows, Leicester Rams and Ewes, shall have been bred in provided they shall *bona fide* be the property of an Exhibitor in Scotl 1st of March 1834. All other descriptions of Stock (extra Stock except have been bred in Scotland.

No Distillery-fed Cattle will be allowed to compete for Premiums in a classes. Cows exhibited for Premiums must have had a Calf during the y

In estimating the ages of Stock, the same rules are to be observed as by the third article of the Regulations for the Stirling Show, p. 52.

The usual Regulations of the Society, with respect to Shows of this kir far as applicable to the Aberdeen Meeting, must be strictly adhered to; particular, the Judges shall be instructed not to award Premiums to Cows or Heifers, which shall appear to have been fattened for the butcher—the being to have animals of the above description for the purpose of Breeding the Regulations generally, intending Competitors are referred to those Meeting at Stirling, at pages 52, 53, 54, and 55.

THE VETERINARY SCHOOL.

This Establishment is now in its tenth session, under the turer appointed by the Society, Mr Dick, a Graduate of th terinary College of London. Students from various parts c country have received instruction in the anatomy and dis of the horse, and other domestic animals, in the best syste treatment and cure, in stable management, and in the mos proved and scientific modes of shoeing; several of these stu have been sent to attend the class by Local Agricultural As tions, and others have attended on their own account. The of Lecture is accommodated to the convenience of student tending the Agricultural and other Classes in the Universit Those students who attend two courses, and are afterwards f qualified at the annual examination by the Committee of Me Examinators, receive Certificates.

Mr Dick occasionally delivers a Popular Course of Lectur a class of gentlemen.

The Lectures and Demonstrations for the Session 1833–1 will be commenced in November next, at the new Lecture- in Clyde Street, Edinburgh.

By order of the Directors,

CHARLES GORDON, *Dep. Secret*

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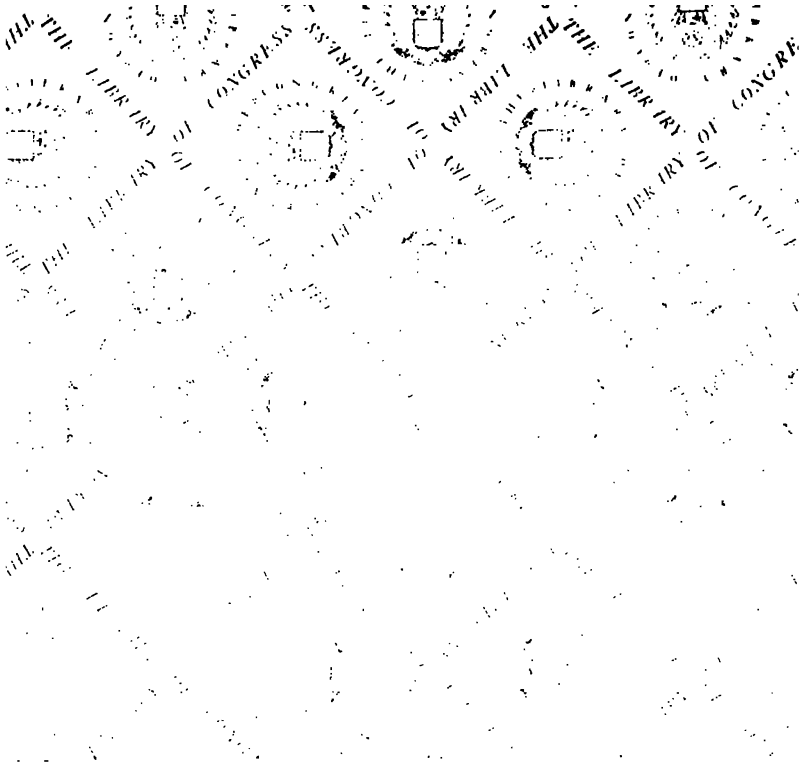
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